THE THERAPEUTIC GAZETTE

INCORPORATING

MEDICINE AND THE MEDICAL AGE

Whole Series, Vol. XXXI. | DETROIT, MICH., MARCH 15, 1907. | Third Series, Vol. XXIII, No. 3.

ORIGINAL COMMUNICATIONS.

FRACTURES OF THE FEMORAL NECK—ANATOMIC TREATMENT.

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Professional incapacity in the management of these cases is the only justification for the text-book unanimity regarding the unsatisfactory results obtained in the treatment of this injury, particularly in the aged and feeble.

From reports of over one hundred cases treated by the "anatomic method," and from six bone specimens procured from the same, I have no hesitation in saying bony union will occur in almost if not in every patient properly treated for five weeks at whatever age and in whatever condition. These cases have recovered with ability to walk well, usually without crutch or cane, without limping in many cases, and in not a few without demonstrable shortening. While recovery without shortening may be considered an absurdity, two of the bone specimens shown in the accompanying illustrations prove the claim, and others show the shortening to be so slight as not in any sense to produce impairment of function.

To my late colleague, Prof. T. J. Maxwell, is due all the credit for discovering and outlining the main features of this treatment thirty-five years ago. I have seen fit to denominate it the "anatomic method," because when properly applied it places all the parts concerned in their normal relations, overcomes the displacing influences of muscular action and the weight of the limb, keeps all soft tissues from interfering with union by being caught and held between the fragments, uses the intact portion of the capsular ligament to align and maintain perfect relations of the fragments at all times, even when the patient is raised to the sitting posture; it causes no pain, but will always relieve the pain from which these cases so often suffer severely, especially upon the slightest movement. It is applicable to all kinds of fractures of the femoral neck and to every physical condition and age of the patient. It can be properly applied by any one with the most ordinary mechanical ability at an expense of from ten to fifty cents, and in three-quarters to one and one-half hours' time.

Successful cases are reported from all methods of treatment, but the results even in hospital service under the care of the best surgeons in the world are so notoriously unsatisfactory on the whole from great pain, frail limbs, great shortening, impaired mobility, and death, that it presents a sad picture indeed.

The method herein presented has not failed to produce good union at whatever age where the treatment has been continued for four weeks, and without pain to the patient. We must forever abandon the old theory that the blood-supply is inadequate, the synovial fluid interferes with solidification of the callus, or that immobilization of the fragments cannot be secured.

The essentials of treatment, briefly stated, are:

1. Reduction of the fracture by flexing the thigh at right angles to the trunk to bring the line of action of the psoas and iliacus above and away from contact with the anterior surface of the capsule, so that the muscular action cannot force soft parts between the fragments or disturb alignment (see Figs. 1, 2, and 3).

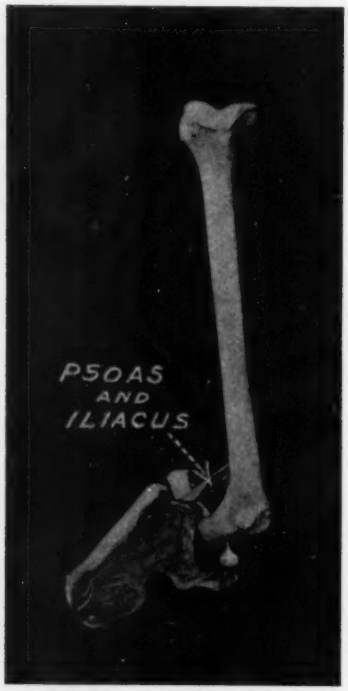

FIG. 1.—Shows psoas and iliacus out of reach of the fragments, when thigh is flexed at right angles to the trunk, so they cannot force soft parts between the fragments. This position should always be the first step in reducing fractures of the femoral neck.

2. Outward pull upon the upper end of the lower fragment by an assistant to bring the trochanter major as prominently on the injured as on the sound side, while traction is made on the limb in the long axis of the body until all displacement and deformity, as indicated in the length of the limbs, position and prominence of the trochanter majors, are overcome.

3. The adjustment of a steady lateral pull on the upper end of the lower fragment, and by Buck's extension and counter-extension to the limb in line with the body to maintain normal length of the limbs.

4. The adjustment of the traction by weight and pulleys to the extremity in line with the body and the lateral pull so that there shall be no tendency to shortening, eversion of the foot, flattening of the hip, or dropping of the great trochanter on the injured side behind and internal to its normal level with the opposite side because of weight or muscular action. Such a plan of extension, counter and lateral extension, will, when properly applied, overcome the action of all the powerful muscles passing over the fracture line, some of which act vertically, as rectus, biceps, sartorius, semitendinosus, semimembranosus, gracilis, tensor vaginæ femoris, and vertical portion

FIG. 2.—Shows fracture of the femoral neck changing point of resistance from the femoral head to the great trochanter, making the psoas and iliacus powerful external rotators instead of internal rotators. It also shows the tendency of the muscles to fall or force the capsule between the fragments, preventing bony or other useful union. This muscle action is easily shown by the above demonstration. This is the principal reason for eversion of the foot almost always noted in these fractures, not impacted, rather than weight of the limb as formerly supposed.

of adductor magnus; obliquely, as the adductors, glutei, and pectineus; transversely, as the gemelli, quadratus, pyriformis, and obturator; while the powerful psoas and iliacus, formerly neutral or internal rotators, now become powerful external rotators because of the change in the point of resistance to their line of action, which formerly passing through or internal to the femoral head, now has become external, falling through the greater trochanter.

FIG. 3.—Shows normal position of the psoas and iliacus in extension, resting directly in contact with and pressed firmly against the anterior surface of the capsule. Also shows muscles are internal rotators or neutral while femoral neck is intact, because resistance (femoral head) is internal to the line of action of the muscles.

The foot of the bed must be raised enough to overcome by the body weight the tendency to slide toward the foot of the bed; the side of the bed corresponding to the injury must also be elevated to overcome by body weight the tendency to be drawn toward the lateral point of traction. The lateral traction must be made sufficiently forward (from 8 to 15 inches) as well as outward to raise the upper end of the lower fragment to a position corresponding with that of the opposite trochanter, and to overcome all tendency to eversion of the foot by the extra external rotating force of the limb's weight and the altered rotating action of the psoas and iliacus (Fig. 6).

Such an adjustment of traction force will cause the resultant of the traction to be in line with the neck of the femur, and so use the intact portion of the capsular ligament as a close-fitting sleeve to adjust and align all fragments. It must therefore follow that as no muscle or other displacing force can act directly upon the upper fragment, which is perfectly passive, and which by its free mobility in the acetabulum will be at once in perfect alignment with the lower fragment, if the proper amount of traction be steadily continued that adjustment of the fragments must continue whether the patient be lying flat on the back or in the sitting posture. This fact has enabled all patients treated by this method to be raised daily or several times daily to the sitting posture for cleansing, or if needed remain a few moments in this position to rest, to relieve the tendency to hypostatic congestion, or to bathe and massage the back.

No pain whatever results from this elevation to the sitting posture, and no possible disturbance takes place in the relations of the fragments.

The longitudinal traction by Buck's extension over foot pulley will in a well-developed male require to be fifteen to twenty-five pounds, and the lateral traction about two-thirds as great as the longitudinal, usually ten to sixteen pounds. The weights must be greatest at first and reduced later, as the muscles tire and cease all spastic contraction. The height of the lateral pulley will vary with the amount of weight and eversion tendency in the thigh, and usually presents a forward and outward pull at an angle of forty-five degrees. The elevation of the foot of the bed will usually be about 10 inches and the side

about 5 inches, each to be just enough in every case so that the patient's body weight will overcome the tendency of the patient to be displaced toward either traction point. When the traction force is so adjusted that it overcomes deformity by overriding of fragments, and overcomes muscular spasm, the patient will be free from pain. The use of buckets or jugs containing sand or water attached to lines over the pulleys enables a ready adjustment of the weight to

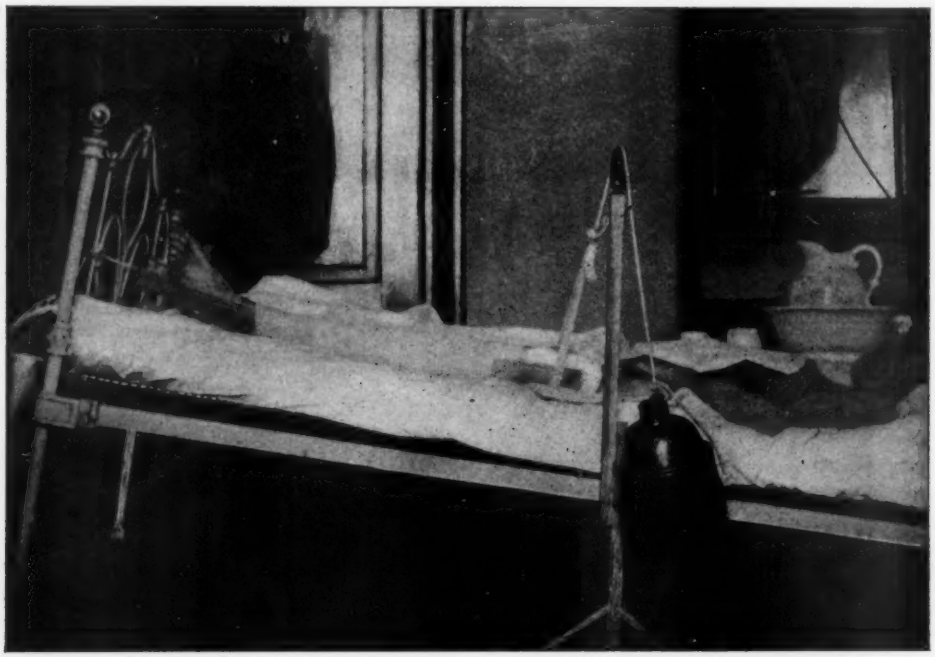

FIG. 4.—Position and dressing as ordinarily applied at home with jug or bucket filled with sand or water to regulate the amount of weight.

the needs of the case by removal or by additions to their contents.

The adhesive plaster used for the traction should be strong, have good adhesive property, and be non-irritant to the skin; it should be at least two inches wide. It is placed on the leg and thigh after shaving, and should extend from three inches above the ankle to at least the middle of the thigh to give extensive traction surface, and thereby avoid slipping or discomfort from the heavy traction on a small skin area. The long strips should be reënforced by an encircling strip above the ankle, above the knee, and at the upper extremity of the plaster, and should be kept at least some hours in close contact with the skin throughout by slight compression of a well-fitting roller bandage to insure even and strong adhesion at all points. A spreader foot-piece should be so placed as to keep pressure off the malleoli. Around the upper anterior, inner, and posterior aspects of the thigh should be molded a binder's board six inches wide to prevent rolling up of the bandage or adhesive plaster attached to the lateral traction, thereby preventing the discomfort of cutting into the thigh by string-like constriction. The lateral traction must pass around the binder's board as high up as possible; this plan will sufficiently distribute the traction that no discomfort is produced by the lateral pull. The patient will from the first be able, by aid of the sound leg, to lift the hips so that the bedpan can be easily placed without pain to the patient or any

possible disturbance of the fragments. Every two or three days the longitudinal pulley traction should be substituted by equal hand pull upon the thigh, while the knee is raised and the leg flexed at least thirty degrees to prevent ankylosis, which will otherwise in some cases be very annoying. This also can be done without any pain or disturbance of the fragments. Failure to heed this last precaution has caused all the discomfort and incapacity

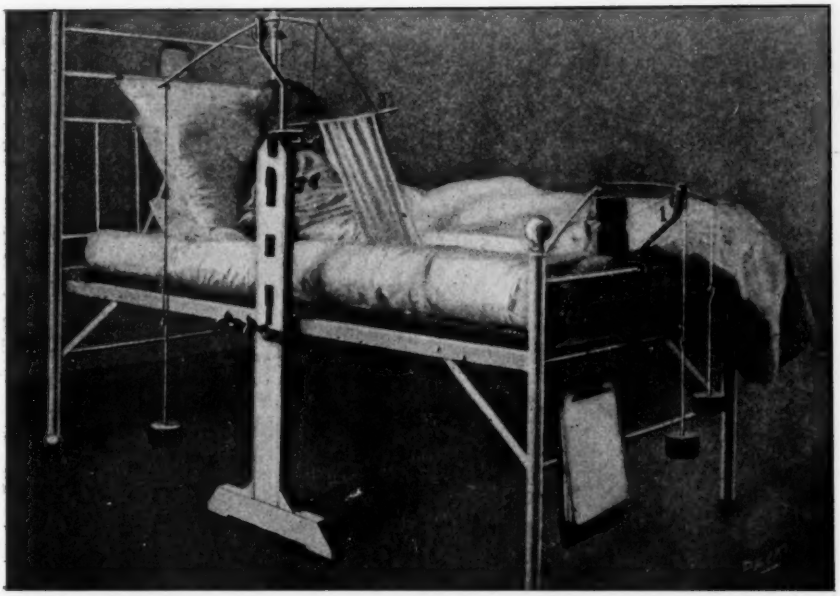

FIG. 5.—Ruth's extension apparatus. As illustrated by Fowler, Volume II, page 512, the patient in semisitting posture, the foot and side of the bed not raised. 1, Buck's extension in the long axis of the limb; 2, lifting arrangement for relieving the pressure on the heel; 3, lateral extension and inward rotation apparatus (Ruth).

resulting from the injury in three cases treated by this method.

There is not the slightest need for differentiation of the various forms of fracture of the femoral neck, as all varieties are reduced and maintained in the best possible position by the same means.

Impacted fractures of the femoral neck in good position require no treatment but rest if the impaction remains. Should marked deformity exist, as indicated by shortening, eversion, or inversion, the impaction should be broken up, and reduction accomplished and maintained as above outlined. While the main part of the anterior portion of the capsule passes from the rim of the acetabulum to the intertrochanteric line, there are many strong fasciculi passing between the femoral neck and the capsule on the anterior as well as posterior surface; these are so many and strong that even in cases in which the femoral neck is comminuted and the capsule one-half destroyed, if traction be made sufficiently strong in line with the normal position of the femoral neck all fragments will be at once aligned, and if the traction be made continuous reduction must remain permanent and union will be certain if the patient lives four weeks. In almost all cases the capsule is not extensively lacerated unless unwarranted manipulation is done, so that if the anatomic method is followed the capsule acts not only by its sleeve-like adjustment but by aid of the fasciculi to maintain the fragments in position. I have abundantly proven these facts by experiments on the cadaver and illustrated the same by wet specimens.

In cases of children especially if impaction has occurred the method of Whitman, viz., forced abduction to the limit of the abduction range of the opposite limb as a guide, will render the anterior portion of the capsule (which is always intact) taut, as soon as the top of the great trochanter impinges against the upper edge of the acetabulum, and give the neck of the femur the proper angle with the shaft. This position will adjust and maintain proper reposition while the plaster is being applied for the purpose of securing fixation and maintaining a degree at least of extension.

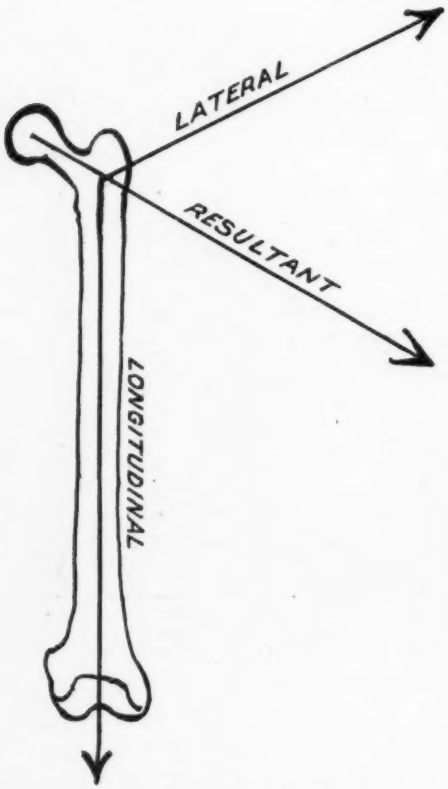

FIG. 6.—Longitudinal, lateral, and resultant forces. (Moore.)

The following objections will always obtain to the method:

First, fractures through and causing separation and splitting of the great trochanter make the correction of the deformity impossible by abduction, because the leverage of the femoral shaft upon the top of the great trochanter against the brim of the acetabulum as a fulcrum cannot be used to render the capsule taut and so secure and maintain alignment of the fragments. The bone specimens shown in Figs. 16 and 17 are a case in point, and illustrate the impracticability of the method. These cases can seldom be differentiated from other forms.

Second, the rapid loss of adiposis in the obese, who represent a large proportion of these cases. These are notoriously bad cases for the use of plaster because of, first, lack of fixation, and secondly, impossibility of maintaining extension. Any plaster dressing on the obese will be decidedly loose in three days; this will progressively increase at a time when fixation is imperative to obtain union with the minimum of deformity. Four to five weeks of maintained fixation and adjustment are absolutely necessary to secure union which will maintain permanent relations without progressive deformity.

Third, the aged, who form the major proportion of these cases, are illy prepared for prolonged pressure contact, hence the damage from the use of a permanent dressing, which does not admit of ready change or inspection and release of damaged points from pressure.

Fourth, adjustment and fixation can be accomplished by the much easier and safer method herein advocated.

In one of my cases daily careful adjustment of position and dressings was required to avoid extensive sloughing and bed-sores due to age and great enfeeblement. Her most intimate friends and relatives, realizing the very feeble hold she had

lations of the fragments while the position is maintained by plaster of Paris.

This method of Whitman's is for children, I believe, next in importance and value to the anatomic method. I do not understand that Whitman ever advised the method for adults, nor do I think it should be so used, though Ridlon has championed the method for adult cases, adding thereto, however, heavy traction in the abducted

upon life and believing death in a few weeks at most was certain, advised abandonment of the treatment under the delusion she would be more comfortable. This patient (number seventeen in my article published in the *Journal of the* Phelps has recognized the necessity for use of lateral as well as longitudinal pull to place the joint at rest in cases of morbus coxarius, and has applied the principle in his famous long hip splint. Why the need for using the same principle in fractures

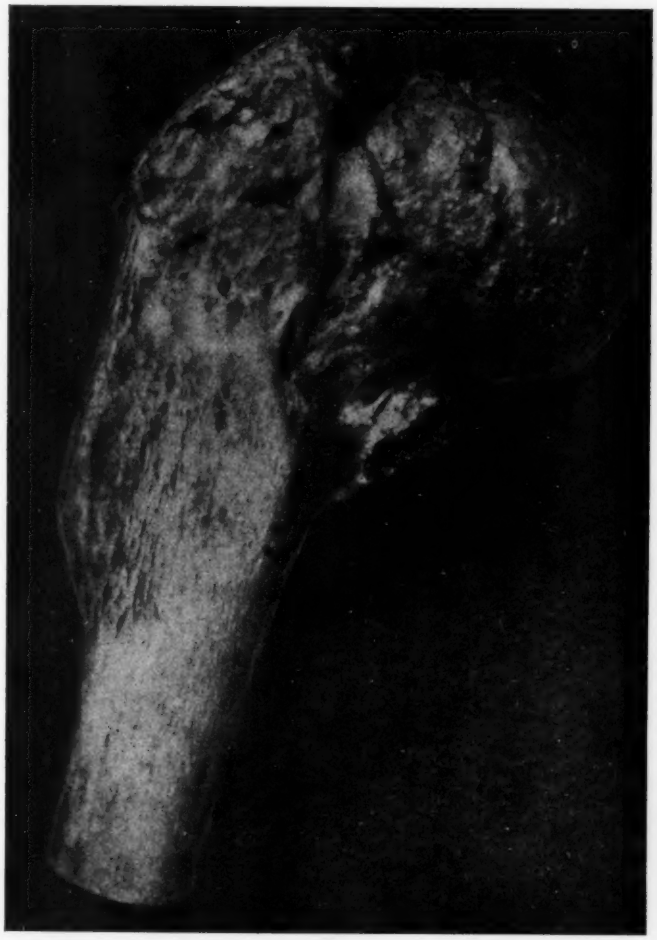

FIG. 7.—Case 14, anterior view. (See the *Journal of the American Medical Association*, Aug. 26, 1899—Ruth.) This patient was seventy-eight years old when the fracture occurred. Recovered with one-half inch of shortening. No impairment of function, and used the limb without cane and with no limp for eight years, doing the work of a farmer's housewife without domestic assistance.

American Medical Association, Aug. 26, 1899) made a recovery without shortening, no impairment of function, and walks without crutch or cane, without limp or halt, having had good use of the limb for nearly eight years.

For many years no less an authority than of the femoral neck was not sooner recognized I cannot understand.

Case 43, reported by Dr. C. S. Bishop, of Fairfield, Iowa. B. D., aged nine years, was kicked by a horse on the right hip at 5 P.M. March 30, 1895. Stood all night on opposite leg leaning against his father.

The foot of the injured leg was everted and one and one-half inches from floor. Pain severe. He was put to bed, and under anesthesia the hip, which was supposed to be dislocated, was found to give crepitus; trochanter rotated in same position without describing an arc of a circle. his home on a cot. At the end of the week longitudinal weight was reduced to six and the lateral to four pounds. Allowed to sit up in bed as much as he desired, and to move about as much as the cords and weights would permit. No pain following first six hours after adjustment of appli-

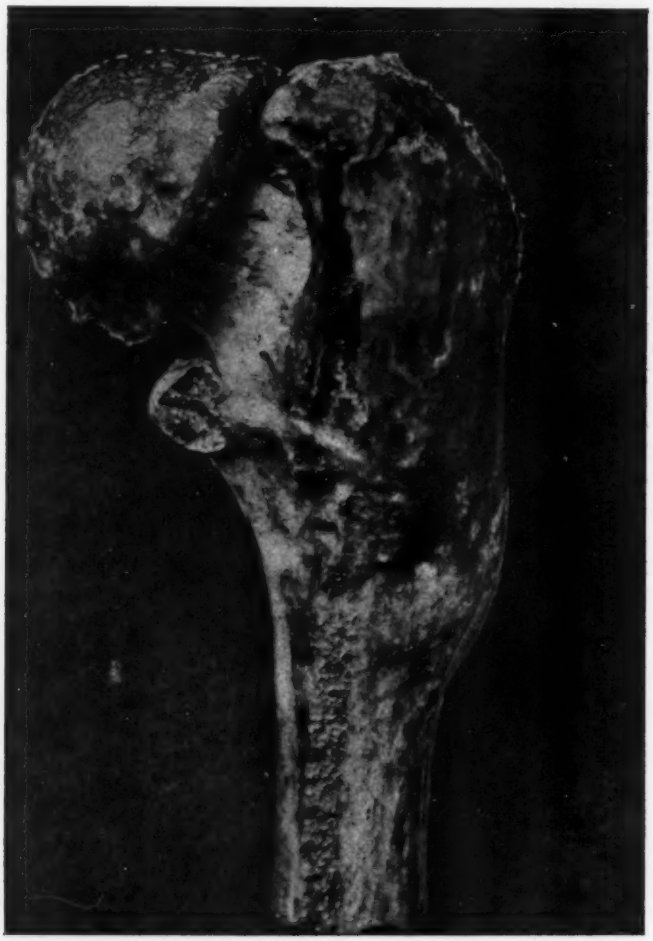

Fig. 8.—Case 14, posterior view.

Shortening one and one-half inches; complete eversion. Diagnosis, intracapsular fracture of the neck of the femur. Treatment as recommended by Professor Maxwell. Extension nine pounds (longitudinal), lateral extension six pounds, corrected tendency to displacement. Three days later patient was moved two miles to ances. Patient ate and slept well. Put on crutches after twenty-fourth day. Six months after no limp, no shortening, perfectly useful limb. So slight was the discomfort during the treatment that he said he intended having the other leg broken to double the donations received during confinement from relations and friends.

Case 44, reported by Dr. I. S. Buzard, of Russell, Iowa. W. W. A., aged twelve years, on January 5, 1905, sustained a fracture of the neck of the femur. Shortening

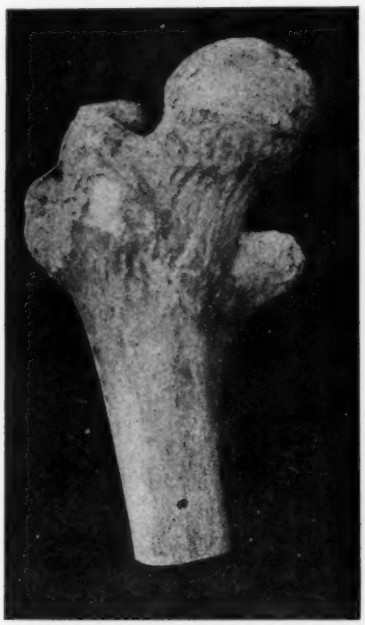

FIG. 9.—Fracture of neck of femur. Case 2. (See the *Journal of the American Medical Association*, Aug. 26, 1899—Ruth.) Fracture occurred at seventy-two years of age; leg was used for twenty years afterward. No perceptible shortening.

two inches, slight eversion. Diagnosis made under anesthesia. March 16, 1905, slight eversion, shortening three-fourths of an inch, some limp, union good, using crutches, but can bear weight on limb and can walk without pain. September, 1905, three-fourths of an inch shortening, some eversion and stiffness.

Cases 45 and 46 I append below in full as reported to me by Dr. Walter L. Hunt, visiting surgeon to M. E. Hospital, Bangor, Me. The only remark I wish to make relative thereto is that in the case reported as 46 Dr. Hunt has given the age as seventy-nine, while in a previous letter to me he gave the age as eighty-four; the latter is probably correct. Case 25, reported by me in the *Journal of the American Medical Association* of December 21, 1901, and treated by F. S. Rebo of Alexandria, Mo., and W. A. Rebo of Canton, Mo., was eighty-six years old. This patient recovered without perceptible shortening, and used the leg for several years afterward without impairment of function.

Case 45, reported by Dr. W. L. Hunt, of Bangor, Me. Mrs. E., of Brewer, Me., a farmer's wife aged seventy-six years six months and three days, on August 10, 1903, while lifting a child into a wagon fell backward with the child in her arms, receiving an intracapsular fracture of the left femur. With my son, a medical student, as assistant she was etherized, and there were present pain, preternatural mobility, audible crepitus, from one to two inches of shortening, marked eversion, and the trochanter major made no excursion on rotation. She was treated by Professor Maxwell's method, and was very comfortable while the bone was healing. She was first dressed on October 6, 1904. For some time after this date she had a bad knee, due to great carelessness on my part in not seeing that the knee should be much more frequently flexed. At the present time she goes everywhere she wishes, has no limp, and has one and one-eighth to one and one-fourth inches of shortening. For a period of six weeks while a barn was being erected

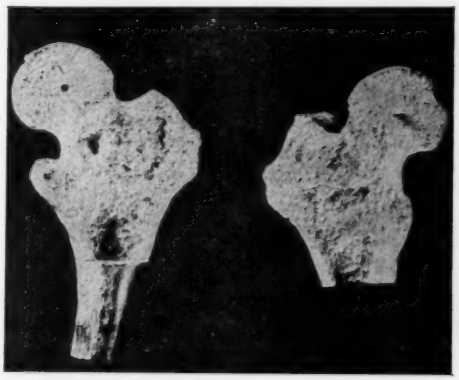

FIG. 10.—Vertical section of Case 2. (See report in the *Journal of the American Medical Association*, Aug. 26, 1899—Ruth.) Shows bone from Case 2 removed after twenty years of service following fracture at seventy-two years of age. It shows perfect repair as to bony union in the narrow part of the femoral neck, and forever places all cavil on this point at rest, as to the possibility of securing bony union after fracture of narrow part of the femoral neck.

she this summer (1904) did the work for a family of eleven persons.

Case 46, a more remarkable one, was that of Mrs. K., of Bangor, which I saw through the kindness of Dr. Swett and his daughter Caro Swett, M.D., late of Johns Hopkins. This woman was nearly blind and fractured the right femoral neck by tripping on a rug at the age of seventy-nine years and seven months. Five days after the accident, which occurred July 17, 1903, she was etherized. Two inches of shortening was found, as well as crepitus, eversion of the foot, preternatural mobility, and the head of the bone made a short excursion on rotation. She was very weak and feverish and had a cough, but made a good recovery from what seemed to be an almost hopeless condition, getting out of bed about the last of September, 1903. To-day she walks without a limp and shows no remains of her accident. I cannot say how much shortening there is now, but Dr. Swett says there is about an inch. This case I am sure would have died under any other treatment. I would propose in cases of impacted fractures of the neck that the fixation be broken under ether, and this treatment followed in future cases of this fracture. I am very much pleased with these great results, and hope to see this method widely known and exclusively adopted. I have treated quite a number of cases in my twenty-seven years of active practice, and have never had a good result follow the old method. If you should have anything published in the future I would be happy to see it. Especially I would like to know if there were any failures.

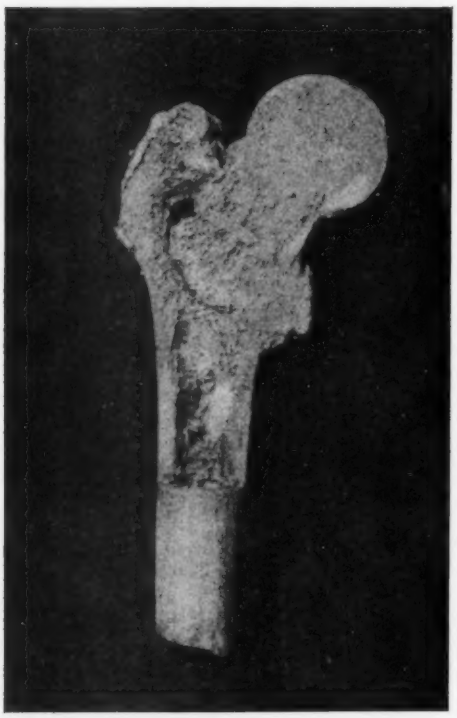

FIG. 11.—Case 34. (See the *Journal of the American Medical Association*, Nov. 29, 1902—Ruth.) Union in four weeks' treatment not begun for one week after fracture. Position perfect. Death from cerebral softening. Had the patient lived one year the result would have been as perfect as in Case 2, with absolutely no shortening.

Case 47, reported by Dr. O. B. Yarnell, of Bowen, Ill. Mrs. L., aged sixty years, sustained a fracture of the right femoral neck together with dislocation of the right shoulder-joint June 20, 1904, by falling from a ladder placed in a wagon while she was picking cherries. After reducing the shoulder attention was given to the lower limb, which was found to be three-fourths of an inch short and completely everted. Crepitus was present on rotating the limb. Diagnosis, fracture of the femoral neck. Treatment was by the "anatomic method" by longitudinal and lateral extension. No pain whatever after application of the dressing. Recovery took place promptly, and patient was up six weeks after injury with absolutely no shortening and with a good, serviceable limb.

Case 48 was published in full in the THERAPEUTIC GAZETTE of October 15, 1900, page 654, by Dr. J. Dutton Steele, of Philadelphia, Pa. This patient, aged fifty-nine years, weight 170 younds, January 21, 1900, fell on icy pavement, and was at once unable to walk, and was in severe pain, with eversion of foot and leg, inability to move limb, pain on movement, and one inch shortening. Two days later Dr. Edward Martin saw the case in consultation with Dr. Steele and confirmed the diagnosis

of intracapsular fracture of the femoral neck. Shortening at this time two inches; eversion complete. Under advice of Dr. Martin the dressing recommended by Dr.

FIG. 12.—Anterior view, Case 29. (See *Journal of the American Medical Association*, Nov. 29, 1902—Ruth.) Royer, aged eighty-one. Recovery functionally perfect. Death caused eight months later by sunstroke while at work in his orchard.

Ruth (*Journal of the American Medical Association*, Aug. 26, 1899) was applied. In eight weeks the following results were obtained: ability to slightly invert the limb and foot, shortening one-fourth of an inch, no unnatural mobility, and no pain. Eight months after accident patient walked without cane, except upon unusual occasions. Shortening still one-fourth of an inch, eversion twenty degrees. During the period of treatment it was extremely hard to keep the foot and leg at a proper degree of inversion. (This was probably due to lightness of the lateral pull on a limb so heavy, and the fact that the lateral pulley was not placed sufficiently far to the front.—Ruth.)

Case 49, reported by Dr. P. E. Hanes, of Maryland, Iowa. Mrs. T. S., aged sixty-three, on March 7, 1900, fell on a door-step while going out of the house, causing fracture of the femoral neck. Reduced and treated by the Maxwell anatomic method of longitudinal and lateral extension, with recovery resulting in one and one-half inches shortening. She has used the limb without crutch or cane for five years after the injury.

Case 50, reported by Dr. W. M. Haggett, of Nauvoo, Ill. Mrs. B., aged about sixty years, in September, 1904, sustained a fracture of the right femoral neck and Colles's fracture of the left radius in an accident. Dr. Haggett was called and requested the assistance of Dr. Ruth, who set and dressed both fractures. Diagnosis was made and reduction accomplished under chloroform anesthesia. Shortening of lower limb of over one inch with complete eversion, rotation of the femur, which gave no arc of a circle to the trochanter major, and crepitus were the diagnostic evidences of fracture of the femoral neck and were unmistakable. Recovery without more than one-half inch of shortening was secured in six weeks and remained permanent. Use of the limb was free, with slight if any impairment or discomfort after

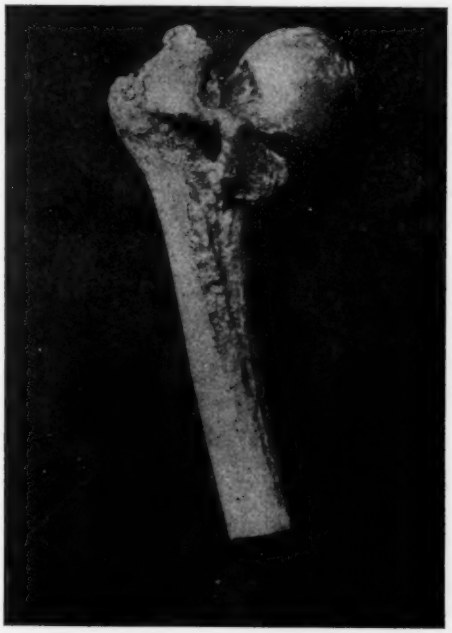

FIG. 13.—Case 29, posterior view.

six months. Some eversion continued, however, to testify to the fact of a fracture of the femoral neck. She suffered severe pain at times in the early part of the treatment. No pain the last two weeks of the

FIG. 14.—Case 22, showing shortening of right femoral neck with no change in the vertical measurements from the lesser trochanter to the top of the femoral head. There is no shortening in vertical measurement because the neck stands more nearly vertical to the shaft.

treatment. Pain in early part of treatment was probably due to severity of other injuries at least in part.

Case 51, reported by Dr. W. M. Haggett, Nauvoo, Ill. Mr. U. K., aged eighty-five years, fell December 11, 1904, on the doorstep of his shop and fractured the neck of his left femur. The diagnosis of fracture of the femoral neck was positive because of crepitus, eversion, shortening, and severe pain with inability to move the limb. Fracture reduced and treated by the Maxwell method of longitudinal and lateral extension. From that time on he suffered no pain, and in four weeks the appliance was removed and he was able to be taken from his bed and sit in his chair. He occupied his chair and bed for three weeks longer, when he began to walk with the aid of his canes. For several years he had been afflicted with rheumatism, compelling him to use canes in walking. He now gets around as well as he did previous to the accident. Considering his age the result is very gratifying.

Case 52, treated and reported by C. E. Ruth, of Keokuk, Iowa. Mrs. B., aged seventy-four, a cripple for eight years by injury to the left knee, while on crutches fell and produced fracture of the right femoral neck, which was diagnosed under chloroform; this gave crepitus and rotation without the trochanter describing the arc of a circle. Eversion was complete. The amount of shortening could not be estimated, as the left leg from flexion and long disuse could not be used as a standard. She was treated four weeks by longitudinal and lateral extension by the Maxwell anatomic method, at which time union had taken place. At this time she took malarial fever and had a violent chill. She never recovered, and died from exhaustion two months later. Figs. 16 and 17 show the nature and extent of this injury, which was a fracture through the base of the neck splitting off the great trochanter and extending three inches below the lesser trochanter posteriorly. This case illustrates the impracticability of the plaster abduction adjustment and fixation.

I have received reports of about thirty more cases, but have not been able to get them in sufficient detail and completeness to embody in this paper.

FIG. 15.—Case 22. (See the *Journal of the American Medical Association*, Dec. 21, 1901—Ruth.) Slight eversion.

Cases in which there is marked eversion of the foot remaining or great shortening after union are due to imperfections in carrying out the technique. These cases have been reported from all parts of the United States; it is not the record of one treatment with the minimum of mechanical skill; but the better the method is understood the more nearly perfect the results will be. The report of Drs. Ochsner and Moore below exactly coincides with my findings and experience.

FIG. 16.—Case 52 in this report. Anterior view, showing separation of great trochanter and fracture running through beyond intertrochanteric line and illustrating the impossibility of effecting correction by the Whitman method. It is moreover impossible to differentiate this fracture with certainty from fracture of the narrow part of the neck.

man, but of many men. The mystery is not that some have secured almost perfect results with a fair degree of uniformity while others have been less successful; the marvel is that the results are generally so good. Although some can have had but little experience, this only proves the claim that any one can successfully apply the

In the original report of all these cases the name and address of the physician who treated the case may be found, so that any one may look them up for subsequent reference or verification.

To these fifty-two cases should be added sixteen reported by Dr. Ochsner, of Chicago, in the October, 1904, number of the

Annals of Surgery, pages 608-9, and four cases reported by Dr. Moore, of Minneapolis, in the *Northwestern Lancet* of March 18, 1904, making a total of seventy-two cases, with photographs of bone specimens received from six cases, which warrant the following summary and conclusions:

1. Cases between eighty and eighty-eight, 12.

2. Union with ability to walk well, 8.

3. Non-union (treated only four or five days), 2.

4. Paralysis preventing walking, 2.

5. Under eighty failure to secure union, none.

6. No failure to secure serviceable limbs in any case under seventy years so far reported, excluding cases in which treatment was abandoned inside of three weeks, death from intercurrent malady, or in which the injury is too recent to report. This gives serviceable limbs in one hundred per cent in cases under eighty years of age.

7. Percentage of success in patients over eighty years of age, sixty-six and two-thirds.

8. The mortality from this method is as

FIG. 17.—Case 52. Posterior view, showing separation of greater and lesser trochanters, intertrochanteric line and fragments extending three inches below the great trochanter. Abduction attempts at correction must only increase the displacement of the fragments. Union was secured in four weeks.

low as, if not lower than, that by any other plan of treatment.

9. Usually there is an entire freedom from pain, never any severe pain.

10. There is perfect immobilization of the fragments.

11. It is easy of application, with almost no expense for the dressing.

12. It can be applied by any one with the most rudimentary mechanical ability.

13. The method admits of change of position for rest, cleanliness, dressing, massage, and to relieve the tendency to hypostatic congestion.

14. Every part of the body is accessible as often as may be needed for any attention whatever.

15. The bedpan and urinal can be used with ease.

16. The sitting posture is attainable at any time and can be used as long as desired or indicated.

17. To this should be added absolute certainty of union if the patient lives and is treated four weeks.

18. It gives the greatest proportions of recoveries with the minimum of deformity or impairment of function.

19. It is applicable to every age and physical condition.

THE TREATMENT OF ARTHRITIS DEFORMANS.[1]

BY JOHN H. W. RHEIN, M.D.,
Neurologist to the Howard Hospital of Philadelphia.

What is known of the pathology of arthritis deformans does not help very much in suggesting any specific line of treatment. While the morbid anatomy has been well worked out, the etiology is more or less conjectural. The theory that the disease is of neuritic origin, which is supported by Sikes, Remak, Latham, J. K. Mitchell, and others, is not acceptable to most authorities. Of the other views held on the subject of the etiology of this disease, none is of sufficient weight to deserve consideration, excepting the theory that it is an infection. This was first defined by Schüller, who succeeded in isolating from the diseased joints a polar-staining bacillus. Ballantyne, Wohlmann, and Blaxall found a polar-staining bacillus in 24 out of 25 cases. Chauffard, Raymond, von Dungern, and Schneider found microörganisms in the fluid taken from the affected joints. This data is quoted from the paper by Aloysius O. J. Kelly, who looked upon arthritis deformans as an infectious trophoneurosis. Fayerweather studied three cases bacteriologically, and isolated organisms in each case. He concluded that cases of arthritis deformans were of undoubted bacteriologic origin. P. William Nathan divided these cases into two great classes: (1) Metabolic joint diseases of the arteriosclerotic and autotoxic forms; and (2) the infectious polyarthritic forms, basing his conclusions on a study of 200 cases.

It is claimed by the supporters of the bacteriologic theory that the character of the onset of the attack, which is sudden, the rise in temperature, the swelling, heat, and redness of the joints, the leucocytosis, the nervous symptoms, and the tachycardia, assumed to be due to toxins, the frequency of arthritis deformans as a sequel of infectious diseases, the occurrence of complications such as pneumonia, pericarditis, and the like, its polyarthritic character, and the presence of enlarged glands in the neighborhood of the diseased joint, all point to the infectious origin of the disease.

Before entering upon the discussion of the treatment of arthritis deformans, a clearer idea of the probable and possible effects of therapeusis will be had if the morbid anatomy of this disease is briefly reviewed. Walkhoff, of Königsberg, in 1905 gave an excellent appearance of the joints, based upon actual study of a number

[1]Read before the Camden County Medical Society, Dec. 11, 1906.

of cases, and quotes the work of Ziegler in 1877, and Kimura and Wolff. The heads of the bones became cone-shaped and flattened, and atrophic cysts were found in the spongiosa. In all his cases the cartilages were extensively destroyed, this change going hand-in-hand with the changes in the bones. When the cartilages were still preserved the subchondral bone was microscopically normal. The cartilages became softened and disintegrated, and a sclerotic change was seen in the subchondral layers, where the process was most extensive. Button-shaped prominences covered by degenerated cartilages were observed. The cartilages proliferated and small spiculæ therefrom filled the superficial medullary canals, and fibrous tissue, rich in cells, replaced the yellow marrow of the subchondral bone. Later in the process lacunæ were found in the bone, and these contained proliferated cartilaginous marrow, or fibrous medullary tissue. Papillary proliferations bordering the bone and bony laminæ were found in some cases. The superficial layer of the bony marrow was fibrous and vascular. Atrophy of the bone may take place, though he disagrees with Kimura's opinion that the genesis of the arthritis is a bone atrophy. In a word, the joints become extensively diseased, the cartilages undergoing degeneration, as well as the bony part of the joint, associated with atrophy of the bone, and the formation of osteophytes. The synovial membrane also becomes thickened and diseased. There may be finally ankylosis of the joints, which, however, is not a true ankylosis, but due to the formation of osteophytes and the thickened ligaments.

The treatment of this affection may be conveniently taken up under three headings, namely: (1) Measures directed toward preventing the progress of the disease itself; (2) to relieve the pain; (3) to correct the deformities. At the start-off great difficulty is encountered in gaining the coöperation of the patient in a treatment which must necessarily be systematically carried out for many months. Herein lies the key-note of the success of the treatment. The disease is a slowly progressive one, and it is equally slow, in most cases, to respond to any great extent to the treatment. Failure to relieve the symptoms at an early period becomes discouraging to the patient, and it is with difficulty that he can be persuaded to proceed with the treatment in the face of apparently no improvement. If, however, this difficulty can be overcome, and the patient induced to remain under the proper regimen for months, or even years, the results will be most encouraging. Measures directed to improve the general health and nutrition are highly important. General hygienic measures require especial attention. An outdoor life, alternating with periods of rest in the recumbent posture, carefully regulated exercises, and an equable, dry climate, are important features of the treatment. The digestion must be carefully watched, and the diet should be nutritive, including eggs, meats, milk, sweets in moderation, fruits, and if desired and indicated alcoholic stimulants. All drugs upsetting the digestion, or having a depressing influence upon the general system, should be avoided. The antirheumatic diet is contraindicated. I have seen such a restriction of diet followed by an exacerbation of the symptoms, and a general lowering of the vitality of the patient.

Hydrotherapy has been recommended, such as is obtained at Aix-les-Bains, the hot springs of this country, and elsewhere, but this should be taken with great caution, and discontinued if the effect is to weaken the patient. Mud-baths have also been suggested (Sikes).

The underclothing should be made of woolen, and so regulated that the changes in the temperature and moisture should have a minimum effect upon the bodily temperature. The joints should be surrounded by flannel bandages, and these should be covered with rubber cloth in such a way as to exclude the influence of atmospheric changes.

I wish now to direct your attention to what I consider of paramount importance in the treatment of this disease, namely,

the persistent use of galvanism and massage. When these are properly employed daily for months and years, in association with the general measures described in this paper, I believe they have a marked influence upon the course of the disease, and may in some cases effect a cure.

Galvanism should be applied with large pads, passing the current through the joints, and using as much electricity as the patient can bear. The current should be applied for a period of five minutes to each joint, and the treatment should be given daily.

General massage should be given once a day, and local massage again at some other time of each day. I have under my care at present two cases which have been vastly improved under this regimen. One is a woman of seventy-two years, who had been practically incapacitated for a year, and had not left her room during that time. The treatment was continued for nine months before much improvement was noticed. Massage and electricity always temporarily relieved the pain and stiffness, but it was not until the end of nine months that the patient began to walk. After this the improvement was more rapid, and at the end of three more months she was able to go out and to walk without support, and now, a year later, she can walk eight or ten squares without pain, and the joints which had previously been affected have lost much of their deformity and are practically painless.

The second case, a young woman of twenty-eight, came under my care about a year after the onset of the disease. The joints of the hands and toes were involved so that any motion of these joints caused great pain, and there was considerable deformity in the joints. Walking more than a square was out of the question on account of the pain in the feet. Three months after the treatment was instituted the patient reported that she was able to walk several squares without causing pain in her feet, and that pain was practically absent in the hands, while the deformity was almost *nil*.

I have under my observation at present at the Philadelphia Home for Incurables, 19 cases of rheumatoid arthritis in which I have studied the effect of certain drugs upon the pain. In nine of these cases the salicylates afforded temporary relief. In three cases cannabis indica was effective. In nine cases phenacetine gave the best results. In one case nothing but oil of gaultheria gave any relief. The salicylates and phenacetine failed to help in 10 of the 19 cases. In five cases cannabis indica was of no value whatever. Opium is actually the most satisfactory drug in these cases, but should only be employed when all other measures fail. It must be remembered that in a disease which is as chronic in its course as arthritis deformans the danger of establishing the habit is great. In one case the combination of phenacetine, cannabis indica, and small doses of codeine had a magic effect upon the pains, and it never became at any time necessary to increase the dose of the codeine.

In some of the cases at the Home the pain was slight. In seven cases the pain was moderately severe; in five it was very severe. In two cases the pain had been severe from the onset of the disease; in eleven cases it had decreased; and in six cases it had grown progressively worse.

The distribution of the pain was irregular. In nine cases it was general; in three cases it was confined to the arms and hands; in one to the left hip; in one to the shoulder; in one to the left elbow; in one to the arms; in one to the calves of the legs; in one to the soles of the feet; and in one to the ankles and elbows.

In 14 of the 19 cases the pain was much influenced by the weather. In six cases the pain was worse at night; in six worse in the morning; and in seven cases there was no relation to the time of day.

The prescription which I have found most useful in stimulating the digestion is a combination of strychnine, nitromuriatic acid, pepsin, tincture of cardamom comp., and infusion of gentian comp. The bowels should be kept regular. Insomnia should

be combated by the usual methods. In a word, the whole treatment, other than indicated above, should be symptomatic.

The high-frequency current has been recommended by some electrotherapeutists, and while my experience with this form of electricity has been limited, I have never been convinced of the advisability of employing it.

Finally, let me briefly refer to the value of the vibratory treatment for the relief of the pain, and Swedish movements for the stimulation of the wasted muscles, and the combating of the stiffness and deformity.

I take this opportunity of thanking Dr. H. G. Meiman, of the Philadelphia Home for Incurables, for his assistance in studying the cases at that institution.

A NEW SUBSTITUTE FOR IODOFORM.

BY JAMES H. FORD, PH.C., M.D., INDIANAPOLIS, IND.,

Professor of Surgery in the State College of Physicians and Surgeons (Medical Department of Indiana State University); Chief Surgeon to the Big Four Railway; Surgeon to the Indianapolis City Hospital, St. Vincent Hospital, and State College Hospital.

Formerly I employed a good deal of iodoform in my surgical practice, but owing to its numerous disadvantages had long since abandoned it, although I regretted the necessity for so doing, as iodoform has proved of value in many cases.

Something over a year ago I received a quantity of a new synthetic preparation, composed chiefly of salicylic acid, formaldehyde, and iodine, which was sent to me for experimental purposes, as it was not on the market. This was provisionally called formidine.

Chemically, formidine is designated a condensation product of iodine, formaldehyde, and salicylic acid, having the formula $C_{15}H_{10}O_2I_6$, or it may be called an iodized derivative of formaldehyde and salicylic acid. It is a true chemical compound (methylene disalicylic acid iodide), exhibiting none of the physical characteristics, nor responding to any of the chemical tests for its constituent bodies until decomposed.

Formidine is a reddish-yellow powder, tasteless, and having a slight but not disagreeable odor suggestive of iodine. It is perfectly stable in the dry state, and contains about fifty per cent of iodine in loose combination. When heated, iodine is liberated, the substance melts, then chars, and is finally consumed without leaving any ash. It is insoluble in water, dilute acids, alcohol, and most other ordinary solvents. When brought in contact with alkaline organic secretions it slowly dissolves and develops the characteristics of its constituents, iodine, salicylic acid, and formaldehyde, and then evinces its germicidal power.

When taken internally, formidine breaks down, as above indicated, and iodine, formaldehyde, and salicylic acid are eliminated by the kidneys, as I am informed has been determined by their presence in the urine of animals so experimented upon.

CASE I was a man from the tropics who had become infected and had been treated in a New York hospital for a large perineal abscess, which was opened and drained with apparent recovery. He entered my service in the hospital suffering from a large excavating abscess on the inner aspect of the right thigh, involving Scarpa's triangle. There were also infected inguinal glands. The glands were opened, curetted, and the wounds packed with formidine powder. The abscess in the thigh was opened and more than a pint of foul pus evacuated. Through-and-through drainage was instituted and the abscess cavity washed out with ten-per-cent glycerin emulsion of formidine for a few days, and afterward large quantities of formidine powder were blown into the cavity. The odor promptly disappeared, the pus became thin and soon afterward ceased to form, and the wounds promptly healed by granulation. The results in this case were very satisfactory.

There was no staining of the clothing or dressings, and no irritation due to the drug.

CASE II.—A man fell to my charge in the hospital with an infected knee-joint with metastatic abscess behind the right trochanter. The knee-joint was treated with formidine emulsion and the trochanteric abscess opened and a large quantity of foul-smelling pus evacuated. This was also disinfected with formidine-glycerin emulsion and afterward with the formidine powder. The man made a prompt recovery without any complications.

I have used formidine in a large number of cases, many of them being minor surgical cases—lacerated or contused fingers, hands, toes, or feet, so commonly seen in railroad employees. Many other cases have been seen consisting of abscesses, and these have been treated by free opening and drainage. I have instructed my assistants to irrigate thoroughly with physiological salt solution to avoid coagulation of albumen, as happens so frequently in using antiseptic solutions, especially those of acid reaction. I then have prepared an emulsion or suspension of formidine in distilled water, and this is forced into the cavity, using it in the same manner as I would any other irrigating fluid.

My experience with this chemical agent, in the form both of an irrigating fluid and a dusting powder, has been very satisfactory. No odor has been observed to be generated, such as was formerly so objectionable when iodoform was used. There was no staining of the dressings or tissues. I have noticed, however, that the formidine does become dark in color and is unsightly, but this is of minor moment. There has been no irritation of the tissues at all; no iodoform dermatitis and no pain caused by its use. Some few patients have complained of a hot feeling or a burning sensation for a few minutes, but this invariably passed away promptly and has given no trouble.

NEWTON-CLAYPOOL BUILDING.

THE THERAPEUTIC VALUE OF ARHOVIN.

BY ERNST R. W. FRANK, M.D., BERLIN.

The popularity that the treatment of gonorrhea with internal remedies has enjoyed, and still enjoys, proves that despite the noteworthy advances that the therapy of the disease has made not sufficient attention is given to anatomicophysiological and bacteriological facts. If one reviews the literature of the internal agents that have been introduced within the last few years, one meets with the same uniformity in the various articles. The authors are usually content to report on a greater or less number of simple or complex cases of gonorrhea that they have treated with a particular remedy, at times with and at times without success. Unconsciously the insufficiency of these remedies is frequently demonstrated through the statement that in addition to the internal, local treatment also had been employed. It must be apparent that these purely casuistic reports cannot bring about a true appreciation of the real value of the remedy in question, as long as the anatomicopathological and bacteriological relations, which differ in almost every case, have not been adequately considered.

By reason of the peculiar structure of the urethral mucosa, the internal treatment of gonorrhea has limits beyond which no internal remedy, be it never so bactericidal, can produce any effect. Again and again reference is made in literature to the three well-known observations of Ricord,[1] which he has published in his "Lettres sur la syphilis." Three gonorrheal patients treated with balsam copaiba had fistulas just above the penoscrotal angle produced by artificial constriction of the penis in the seventh or eighth year of life. The gonorrheal process subsided up to the fistula—that is, as far as the urine impregnated

[1] Ph. Ricord: Lettres sur la syphilis, Paris, 1891, pp. 135-143. Also Iconographie de l'hôpital des vénériens and *Bulletin de l'Académie impériale de médecine*, 1849, xiv, p. 593.

with the decomposition products of the remedy named came in contact with the mucosa. The section distal to the fistula, comprising the middle and upper thirds, remained diseased, and was only cured by local treatment. It is the mucosa of just these portions of the anterior urethra that is characterized by its richness in lacunæ and crypts, and it is upon this fact that the chief cause of the therapeutic failure of Ricord's cases depended.

The bacteriological investigations made in recent years with sandalwood oil—to be mentioned further on—have shown that this oil does not possess a gonococcicidal action, and this is probably true also of copaiba balsam and the other balsamics. The real cause of the inadequacy of every treatment of gonorrhea rests on anatomical grounds.

Especially in its anterior section the urethral mucosa contains, in addition to Littre's glands, the so-called lacunæ and crypts of Morgagni. These latter, differing markedly in their number and size, represent pocket-like depressions in the mucosa, and embryologically are to be looked upon as epithelial invaginations. They penetrate the mucosa obliquely, and in such a fashion that they make an acute angle with the inner surface of the mucosa, opening toward the meatus.

The direction corresponds to the urinary stream, so that in passing the urine can never enter into the crypts, but rather closes them. This is in accordance with the physiological significance of the pockets, the mucosa of which contains numerous minute mucous glands, by the secretion of which the mucosa is kept moist and slippery.

It may be mentioned incidentally that some of the Littre glands frequently empty into the lacunæ. Gonococci advance from the fossa navicularis, penetrate into these pockets, and find there an especially favorable environment. Internal remedies can only unfold their activity when, dissolved in the urine, they reach the diseased parts. It must be evident that the bacteria in the depths of the lacunæ and crypts cannot be influenced by such remedies, since the urine does not find its way into these structures. It must, therefore, be definitely accepted that even with the best internal remedies, gonorrheal processes cannot be effectually attacked because the principal seats of the bacteria are closed to the remedy.

Moreover, the bactericidal power of the medicaments in question is often overestimated. As far back as 1895 Valentine[1] demonstrated by experiments that it is not possible to influence the growth of gonococci and other bacteria of the urethral flora when in the preparation of urine-agar plates sandalwood oil urine is used.

I want here to report a case that seems to illustrate these points. In 1900 I was consulted by Mr. D., who had acquired his first gonorrheal infection four years previously. After six months of ineffectual treatment with various injections the patient consulted a well-known clinician, who advised him to stop all local treatment and to drink large quantities of water, and to take sandalwood oil. Within a period of four months the patient took 600 capsules of oleum santali and drank as much as twelve quarts of water per day. He was dismissed cured. Two weeks later, no coitus having taken place, the discharge returned, in which gonococci could be demonstrated. During the succeeding years the patient was treated by a number of physicians, some of whom declared him sound; others treated him with injections, suppositories, and soft bougies. His condition became steadily worse. I found four years after the infection, in addition to two distinct urethral strictures, a large focus in the prostate gland, the expressed secretion of which showed gonococci verified by cultures.

The patient was discharged cured after proper treatment; he is married, and has healthy children. Such failures from purely internal treatment I have seen quite often. They are in accordance with anatomic facts.

Some time ago I received from the

[1]Ferd. C. Valentine, New York: Der Einfluss des Ol. Santali auf das Bakterien-Wachstum, insbesonders auf die Gonococcen. *Arch. für Dermatologie und Syphilis*, Bd. xxxii, 1895, p. 169.

Chemical Institute of Dr. Horowitz, Berlin, a new preparation—arhovin,[1] for which great value in the internal treatment of gonorrhea, and as a urinary antiseptic, was claimed. Arhovin is not a balsamic, but an addition product of diphenylamin and the ester of thymyl-benzoic acid; an aromatic liquid, with a specific gravity of 1055, of feebly cool, burning taste, on account of which the remedy can only be taken in capsules. While the two constituent bodies, since they are not indifferent, cannot be used therapeutically, their addition product (arhovin) is wholly non-poisonous, though not inferior in antiseptic power to either of them. It is insoluble in water, but easily soluble in alcohol, ether, chloroform, and oil. It is absorbed in the stomach in from fifteen to twenty minutes, as can be demonstrated by the green coloration developed when a one-per-cent chloride of iron solution is added to the urine. This reaction probably depends on the presence of a phenyl-hippuric acid. The thymol is changed into thymol-glycuronic acid.

Bacteriological investigations of the remedy have been made by Burchardt and Schlockow[2] and by Piorkowski.[3] These authors state that the decomposition products of arhovin are capable, even in cases of alkaline or ammoniacal fermentation, of producing an acid reaction in the urine. Burchardt and Schlockow found that the arhovin-urine possesses strong inhibitory influence on the growth of bacteria, and that it is capable of arresting the development of pure cultures entirely; and in drinking-water containing large numbers of bacteria to interrupt at once all further growth. The undecomposed arhovin, the authors state, possesses antibacterial power in a lesser degree, because it is insoluble in water. Piorkowski, by allowing arhovin to act in substance and in oily solutions on colon, staphylococcus, and streptococcus cultures, noted an inhibitory influence. Arhovin oil in contact with gonococcus cultures caused their death in from one to two hours.

I have had Dr. Heilman, of Pittsburgh, conduct a series of experiments, which have led to the results detailed below.

Cultures were made from fresh gonorrheal pus on human blood-serum agar as well as on ascites bouillon. With due reference to natural conditions, persons who had never been infected with gonorrhea received arhovin. One or two hours after the ingestion of from six to eight capsules of arhovin (0.25 g.) per day the urine was collected under antiseptic precautions. Only urine from individuals whose urinary tract had always been normal was used for the experiment in order to exclude bacterial contamination.

1. Ascites-agar was inoculated with gonococci: After twenty-four hours, abundant growth. (Control.)

2. Ascites-agar was inoculated with gonococci from the same cultures and sterile, ordinary urine poured over: After twenty-four to forty-eight hours, no growth of gonococci; but development of diplococci arranged in chains and not staining by Gram.

3. Similar experiment, arhovin-urine being poured over cultures: No gonorrheal growth; development of diplococci arranged in chains and not staining by Gram.

4. Ascites-bouillon inoculated with gonococci: After twenty-four hours, abundant growth. (Control.)

5. Ascites-bouillon inoculated with gonococci, an equal amount of ordinary urine being added: After twenty-four to forty-eight hours, no growth.

6. Similar experiment, arhovin-urine being used: After twenty-four to forty-eight hours, no growth.

7. Ten cubic centimeters of arhovin-urine were left twenty-four hours in the incubator at 37° C.: After twenty-four hours, sterile; after forty-eight hours, slight growth of bacteria and cocci.

8. Sterile urine was similarly treated: After twenty-four to forty-eight hours it was still sterile.

[1] Arhovin may be obtained from Kaiser-Friedrich-Apotheke, Berlin.

[2] Burchardt u. Schlockow: Arhovin, ein neues innerliches Antigonorrhoikum. *Med. Woch.*, No. 48, 1903.

[3] Piorkowski: Ueber Arhovin. *Dtsch. med. Woch.*, 1905, No. 25.

9. Arhovin-urine was inoculated with staphylococci: After twenty-four hours, abundant growth.

10. Sterile urine inoculated with staphylococci: After twenty-four hours, abundant growth.

For purposes of control, all experiments were conducted in duplicate or in larger series. They showed that the decomposition products of arhovin, although not able to render the urine strongly bactericidal, give to it inhibitory properties with regard to streptococci and staphylococci; gonococcus cultures were arrested in their development. As, however, on account of their exceedingly great sensitiveness, such cultures are inhibited even by sterile urine, these experiments cannot be considered as proof of the value of arhovin. It must, nevertheless, be said that the results of experimental culture tests are not always identical with the results obtained in practice. The increased acidity of the urine under the administration of arhovin might be unfavorable for the growth of gonococci in the urethra. Moreover, other still unknown physiologicochemical factors might play a part. We have, for example, despite numerous and careful investigations (I refer to those of L. Levin,[1] J. Varges,[2] H. Vieth u. a.[3]) as yet no definite unequivocal conception of the disinfecting properties of the balsamics. The foregoing experiments simply show that arhovin, as well as other internal remedies, does not render local antisepsis superfluous in the destruction of the gonococcus. We must still have recourse to the silver-albumin preparations, the most efficient of which is albargin.

Arhovin, however, will be welcome even more than the balsamics, by reason of its sedative analgesic action on the inflamed mucosa of the urinary tract. I have had no personal experience with the local use of arhovin oil. Several authorities, however, report good results in cervical catarrh and endometritis of gonorrheal origin. Piorkowski has had good antibacterial results with pure arhovin and with a two- or three-per-cent solution in oil. After thirty minutes the arhovin checked the development of staphylococci and colon bacteria in bouillon cultures; and after sixty minutes the bacteria were killed. When arhovin-oil was brought in contact with pus containing gonococci no growth could be obtained on blood-serum-agar plates. Control experiments with pure oil are, however, needed.

All known balsamic agents employed in the internal treatment of gonorrhea have the disadvantage of producing irritation in the gastrointestinal canal and upon the kidneys; even sandalwood oil is not free from such an action. I have lately seen especially disagreeable symptoms of irritation in the digestive organs under the use of gonosan. The patients complained of epigastric pain, nausea, or other disturbance of the appetite and digestion. On the other hand, even after the continued administration of arhovin in a considerable number of cases, I have never heard the slightest complaint, nor have I noticed any signs of irritation. Not infrequently patients have pointed out to me that while during previous attacks of gonorrhea they had suffered from digestive disorders after taking balsamics, they did not experience the least distress after taking arhovin, even when the dose reached from 10 to 12 capsules, each 0.25 g. per day, for three or four days in succession. The sulphosalicylic acid test did not show the slightest trace of albumin in the urine.

I have also found, in common with others, that in cases of gonorrhea or other bacterial infections of the urinary passages, the irritating symptoms are greatly lessened, if not entirely banished, by arhovin, a fact that could be demonstrated with particular clearness in inflammatory processes in the posterior urethra and the neck of the bladder. I therefore look upon arhovin as a useful agent in the treatment of inflammatory, and especially gonorrheal, diseases of the urinary tract.

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[1] L. Levin, cit. in 2.

[2] J. Varges: Zur Kenntnis des Gonococcenharns. *Med. Klinik.*, 1905.

[3] H. Vieth: Ueber die Wirkungsweise der Balsamica. *Med. Klinik.*, 1905, No. 50.

SPECIFIC MEDICATION IN THE TREATMENT OF TUBERCULOSIS.

BY JAMES SAWYER, M.D., ASHEVILLE, N. C.

A little over two years ago (October, 1904), under the caption of "The Use of Specific Products of Tubercle Bacilli in the Treatment of Tuberculosis," I reported fourteen early-stage cases of pulmonary tuberculosis treated with the watery extract of tubercle bacilli, and all of them were at that time apparently cured and in good health. To-day, two to eight years after their discharge, they are all still living and well, except Case 3, which was discharged as apparently cured September 21, 1900. In this case death resulted last winter, over five years after his discharge, when in apparently good health. After exposure the patient contracted pneumonia, and died after an illness of about six weeks. To what extent the previous pulmonary tuberculosis may have contributed to the unfavorable course of the pneumonia I am unable to say, there having been no autopsy. Since this report I have treated and discharged thirty-eight other cases of early tuberculosis, all of which were treated with the watery extract, and all have apparently gotten well and remain so at the present date.

The good results obtained are due to a great extent to a very careful selection of the cases so treated, as none but early-stage cases were accepted, except a few trial cases to be mentioned later. In each instance the diagnosis was verified by either the tuberculin test, the presence of tubercle bacilli in the sputum, or sufficiently pronounced physical signs, as well as by the history of the case. I have no doubt that the results would have been different if far-advanced cases had been accepted for treatment.

In common with others who are treating tuberculosis, I am endeavoring to discover and use the best method, or combination of methods, of treatment. Therefore I give my patients the advantage of all other aids that are of value in the individual case, and hence it will be understood that the watery extract is not the only thing that has been used in the treatment of these cases. The usual hygienic, dietetic, climatic, and other methods suitable to each case were used as indicated, but the watery extract was employed in every instance, and to it I attribute certain of the good results.

The uniform favorable results in my cases have been a source of constant surprise to me, and as to the demonstration of the value of the method of treatment employed I fear a skeptical attitude by colleagues who have not given it a painstaking trial, and who even then may have had a less favorable experience if they have not also confined their application of it to the favorable early-stage cases as I have done. However this may be, I can but state my results as they are; yet I wish to again call your attention to the class of cases which I subjected to this method, in which the exclusion of advanced and exhausted cases of phthisis has no doubt had a great influence. Not only have I excluded such cases, but as far as I could determine I have tried to also exclude cases which, although as yet showing no cavities or massive caseous pneumonias and necrotic changes, have by the presence of high fever and corresponding general decline indicated a rapidly unfavorable course.

For uniform results such a selection is absolutely essential, if, as we believe, the action of specific bacterial products depends upon the production of an increase of resistance—call it immunity if you like—on the part of the organism, through the formation of specific substances in the blood antagonistic to these bacteria and to their products. That such specific products form also in tuberculosis naturally, especially in cases that pursue a favorable course, and that these can be increased artificially through the introduction of specific products of the tubercle bacillus, seems well established by the experimental work of Drs. Koch, Wright and Douglas, and Maragliano, and by others who through the immunization of animals have endeavored to

obtain a serum for passive antitoxic or antibacterial immunization of the tuberculous human subject.

It is only in a limited number of cases that I have been able to make necessary blood tests, and so far they have only extended to the production of agglutinins and their increase during treatment with the watery extract. These examinations, though few in numbers, have, however, in every instance showed a decided increase from time to time as the treatment progressed, and most gratifying clinically was the observation that the increase stood in relation to the general and local improvement of the patient, the latter manifesting itself in retrograde changes in the tuberculous areas, which in the end reached a degree that almost without exception all abnormal auscultatory and percussion signs had disappeared.

A like satisfactory improvement occurred in subjective symptoms. Elevation of temperature gradually subsided, the patient's appearance grew better, there was gain in weight, night sweats when present ceased, and the cough and expectoration likewise became less marked until they stopped entirely. Tubercle bacilli disappeared from the sputum. All patients regained a state of general health equal to, and sometimes exceeding, that which they enjoyed before their illness.

Within the past few years I have made a trial with the remedy in a few of the more advanced cases of phthisis. I have, however, selected only those which showed no marked complications, and in which the general condition of the patient was fair enough to justify the expectation of improvement. These cases appear to me to be of more than passing interest, and that you may have a better understanding of their condition on admission to the treatment it may be permissible to report with some details.

Case I.—J. W. K., aged thirty-two, male. Practically the whole of the left lung was involved, also right apex. There was a cavity in the lower portion of the left upper lobe anteriorly. Pulse was rapid, but not weak, and the temperature ran up to 101° F. His general condition was fair. He came under my care May 1, 1902. He had a left-sided pleurisy early in June, which lasted about two weeks. The use of the watery extract was begun June 26, about which time an ischiorectal abscess developed, which was operated on at once and promptly healed, after which he began to improve. For financial reasons he discontinued the watery extract August 30, after which his condition remained about the same for several months, but his temperature then began to go up and his weight to decrease. On January 6, 1903, the use of the watery extract was resumed, and he began to improve almost immediately, gaining in weight, strength, and general condition. He continued under the watery extract until June 9, 1903, when his condi tion was so good he decided that he could safely stop it. His improvement still continued, though he lost a little weight during the summer months. For several months thereafter he continued to be in about the same condition, with the usual ups and downs, until January 24, 1904, when, from useless and very foolish exposure, he came down with a very severe double pneumonia, which overcame him January 27. The special point of interest in this case is that while he was taking the extract he improved, and his improvement held for several months in each instance after discontinuing it, and though he was under exactly the same treatment all the time he improved only while he was under the influence of the watery extract.

Case II.—A. P., aged twenty-eight, female. Both upper lobes and the left lower lobe were involved, with a cavity in the left upper lobe anteriorly. The temperature went to 101.5° F., the pulse was rapid; she was very nervous and worried about family matters, and her general condition was only fair. She began the watery extract July 4, 1904. Her improvement was slow but constant, and she was discharged December 27, 1905, with her lungs perfectly clear, excepting the left upper lobe, which is the seat of a small, dry cavity. The remarkable

thing in this case is the continued improvement in spite of many unusual worries and trials which happened to fall to her lot. This patient's home is in Asheville, and she is still free from tuberculosis.

CASE III.—F. E. C., aged nineteen, female. The right upper and left lower lobes were involved, with a cavity in the upper part of the left lower lobe posteriorly. On admission her temperature was 101.6° F., her pulse 90 to 98, and her general condition good, save for the absence of her menses for several months and the spitting of blood occasionally. She began the watery extract November 17, 1904, and there was a rapid gain in weight and strength, but the menses continued absent. Local examination was advised and revealed a diseased right ovary. An operation was permitted and performed May 8, 1905. The operation revealed a cystic degeneration of the right ovary and tubercles in the right tube. The ovary and tube were removed; the patient did well, menstruated a month or so later, and continued to do so regularly thereafter. The patient was taking the watery extract all this time, and continued with it until a short time before her discharge, April 6, 1906, when her lungs had cleared up and her condition was better than at any time in her life. She is now at home and enjoying excellent health. How much the operation contributed to the recovery in this case it is impossible to say, though I believe it had a very marked influence upon the course of the disease, and realize that the patient could have hardly recovered without it.

A few other cases similar to these I have still under treatment. Clinically the discharged cases could really be designated as apparently cured, but as we all know the tendency to relapse, to recurrence of secretions in cavities, and reappearance of tubercle bacilli at such times, I shall only say that they are apparently arrested, and I shall not fail to give you a further account of their progress when I shall have occasion to speak again on this subject.

The final test of any method of treatment is not the immediate percentage of cases discharged as apparently cured or arrested, but the endurance of the results that have been attained. In this respect I have likewise reason to be satisfied. Judging from the fourteen cases reported in 1904, and from these later cases, I am led to believe that the cures effected by the watery extract are more permanent and certain than those by any other method, though the number of my cases is still too small and the time of the discharge of the majority of them is too recent to make this statement as final. However, I believe time will prove that in a great majority of the cases so treated the permanency of the cures is real, the results abiding.

I consider the remedy perfectly safe in the hands of an experienced and careful practitioner, and personally I have never had occasion to attribute any unfavorable effects or symptoms to its use. Undoubtedly large doses, improperly used, especially in the beginning of the treatment, may cause reactions somewhat similar to those of tuberculin, but it is much safer than tuberculin, is not cumulative in its action, and it is not likely to cause a reaction when given in therapeutic doses. I have never had a reaction in any case which was being treated by it, but in a very few cases I have used it as a test instead of tuberculin and have obtained prompt reactions therefrom.

It is my unbiased opinion that in the watery extract, taken together with the usual hygienic, dietetic, climatic, and other methods of treatment generally used, we have the best and safest method of treating tuberculosis yet advanced. As above noted, I consider it much more valuable in the early-stage cases, though my experience teaches me that it is also valuable in certain selected advanced cases; and to this extent I recommend it.

This experience I believe justifies me in the belief that in the early-stage cases of chronic pulmonary tuberculosis a cure can be accomplished as a rule by specific treatment combined with the usual methods; and as to the preparation of the specific product of the tubercle bacillus to be used, I naturally prefer the one with which I have become familiar, and from the use of which I have seen nothing but good results.

THE TREATMENT OF CORYZA.

BY E. S. McKEE, M.D., CINCINNATI, OHIO.

This complaint occurs most frequently in the changes of the seasons, spring and fall, but to some extent is with us always, and is one of the most frequent conditions which we are called to treat. The disease probably depends upon a microörganism, though it seems in some cases to be caused by irritation, as from the fumes of certain drugs or dust. Most cases, however, have the appearance of contagion or occur as an epidemic. Persons who eat heartily of animal food and do not take sufficient exercise, live in superheated atmospheres, breathe foul air, and wear too heavy clothing are subject to coryza.

Treatment.—Spray once daily with an alkaline and antiseptic solution, then one-per-cent solution of cocaine with .40 per cent of boracic acid. In five minutes use a two-per-cent spray of antipyrin, and five minutes later insufflate with calomel; lastly, one per cent of menthol in liquid vaselin should be sprayed in the nose.

Among a host of sprays for coryza are the following:

℞ Mentholis, 0.50;
Camphoræ, 0.30;
Liq. petrolati, 30.00.

℞ Cocainæ hydrochl., 0.30;
Mentholis, 12.00;
Camphoræ, 12.00;
Liq. alboleni, 30.00;
Resorcini, 0.30.

M. S.: Spray several times daily.

Adrenalin chloride (1:1000), 4.00;
Cocaine hydrochlorate, 0.60;
.8 per cent salt solution, 60.00.

M. S.: Use as spray two or three times daily, patient lying down a few minutes after using the spray to facilitate the medicine running back into the nose. Patient should remain indoors for some time after this.

℞ Sodii salicylati,
Sodii chloridi,
Sodii bicarb., ää ad 100.00.

M. S.: Teaspoonful in one-half pint of water and use as a spray.

℞ Hydrogenii peroxidi, 30.00;
Hydrarg. bichloridi, 0.05;
Zinci sulphocarbolatis, 1.33;
Aquæ destillat., q. s. ad 130.00.

M. S.: Spray after cleansing.

As a stimulant to the mucous membranes:

℞ Thymolis, 0.02;
Ol. caryophylli, 0.18;
Liq. petrolati, 30.00.

M. S.: To be sprayed in the nares two or three times a day.

℞ Acidi carbolici,
Mentholis, ää 0.06;
Ol. gaultheriæ, 0.06;
Liq. petrolati, f℥j.

M. S.: Use as a spray three or four times a day where an antiseptic is needed.

As a sedative use the following:

℞ Mentholis, 0.06;
Cocainæ, 0.18;
Liq. petrolati, 30.00.

M. S.: Spray two or three times a day.

℞ Ol. caryophylli, 0.50;
Terebini, 0.70;
Liq. petrolati, 30.00.

M. S.: Spray.

℞ Olei cassiæ, 0.12;
Mentholis, 0.15;
Liq. petrolati, 30.00.

M. S.: Spray.

The proper treatment in most cases is to first spray with an alkaline solution for cleansing purposes, then with the curative solution, and follow this with a soothing remedy dissolved in oil.

Snuffing of liquids of an alkaline and antiseptic character, such as are made by dissolving Seiler's or Thrasher's tablets in water, is quite beneficial. A simple alkaline and antiseptic wash which can be made up at home is the following: Salt, one-half teaspoonful; soda, one teaspoonful; carbolic acid, ten drops; in one pint of water. This is best used lukewarm, the patient stooping over and snuffing it through the nose and spitting it out of the mouth. If snuffed through the nose in the erect posture or with the head thrown backward there is greater danger of the solution passing through the Eustachian tubes into the ear and causing trouble. These alkaline solutions, if used regularly in flushing out the nares, are very beneficial to prevent coryza. Another is equal parts of salt, borax, and bicarbonate of soda, one teaspoonful to a

pint of water, used lukewarm. The addition of a little carmine to these solutions makes them look less simple and seems to produce a good effect on the patient's mind. The fluidextract of hamamelis snuffed from the hand every two hours is valuable. Snuffing of powders in coryza has come to be looked upon with suspicion by many because it has been used so much for the exhibition of cocaine. However true this may be, yet an honestly made snuff for coryza and catarrh does much good. The following has been tried and not found wanting:

℞ Acidi boracici, 1.00;
Thymolis iodid., 1.00;
Bismuth. salicylatis, 1.00;
Sodii chloridi, 10.00;
Powdered elm, 50.00.

All should be very finely powdered and intimately mixed by trituration, and if necessary to render it light and fluffy it should be sifted through bolting cloth.

Another good one:

Menthol, 0.05;
Thymol, 0.05;
Eucalyptol, 0.05;
Orris root, 6.00;
Sodium chloride, 6.00;
Powdered elm, 50.00;
Hydrastine hydrochloride, 4.00.

Prepare like the preceding.

Pain and smarting in the nares can be relieved by something like Ferrier's snuff:

℞ Morphinæ hydrochloridi, 0.12;
Pulv. acaciæ, 8.00;
Bismuthii subcarb., 0.25.

A little of this may be insufflated every few hours.

As most of the sneezing in coryza comes from postnasal irritation, it is well to insufflate into this region an anesthetizing powder:

Orthoform, 2.00;
Soziodolate of soda, 10 parts.

Ointments are very much used for coryza and are quite useful. They are most convenient in collapsible tubes. Following is a good formula:

℞ Eucalyptolis, 1.00;
Mentholis, 4.00;
Petrolati albi, 75.00.

Dissolve the menthol in the petrolatum, taking care not to have the heat too high, and when nearly cold incorporate the eucalyptol. This may require to be diluted in some exceptional cases.

Adrenalin is being used quite a good deal in nasal troubles, and seems to act well in ointment, as the effect is kept up longer. Following is a good ointment:

Adrenalin chloride, 0.03;
Normal salt solution, q. s. ad 16.00;
Hydrous wool-fat, 16.00;
White petrolatum, 18.00.

Dissolve the adrenalin chloride in a few cubic centimeters of normal salt solution and incorporate with the lanolin previously melted and allowed to become nearly cold. Finally add the petrolatum and mix well.

This ointment is the same strength as the 1:1000 solution and should be reduced to one-half by the addition of petrolatum in most cases.

Another useful formula:

℞ Thymolis iodidi, 0.65;
Phenolis, 0.33;
Camphoris, 0.65;
Petrolati, q. s. ad 30.00.

Melt the phenol, and in it dissolve the camphor. Melt the petrolatum, and in it dissolve the aristol. Finally mix the two solutions and allow to cool.

Pregnut recommends the following:

℞ Cocainæ,
Chloralis,
Hydrastis,
Mentholis, ää 0.33;
Petrolati, 8.00.

M. fiat ungt. S.: Apply locally in nasal space.

The unguentum hydrargyrum oxidum flavum with equal parts of Adeps lanæ makes a very good ointment.

In Eustachian deafness from coryza Allyn, of Edinburgh, prescribes:

℞ Mentholis, 0.18;
Cocainæ, 0.12;
Petrolati, 15.00.

M. fiat ungt. S.: Paint on nasal mucous membrane as far as possible back into the nose several times a day. This causes a free flow of secretion.

Internal Remedies.—Following is a really meritorious article among the many remedies which are said to cure coryza and catarrh through the blood:

Powdered gentian, 4.00;
Powdered buchu, 2.00;
Powdered uva ursi, 2.00;
Powdered hydrastis, 2.00;
Saccharin, 0.10;
Potassium iodide, 12.50;
Powdered senna, 15.00;
Alcohol, 2.00;
Aromatic elixir, ad 60.00.

Dissolve the saccharin in the alcohol, and add to the elixir in which the iodide of potassium has been previously dissolved. Now add the pow-

dered drugs and macerate for one week. One or two teaspoonfuls an hour before each meal and at bedtime.

The following also gives good satisfaction:

Quinine sulphate, 1.33;
Powdered capsicum, 1.33;
Comp. acetanilide powder, 0.75.

Make 10 capsules. S.: Take one every two hours.

This can also be made into tablets, but is better in capsules on account of being made up fresher and in smaller quantities. Another good formula for tablet or capsule is as follows:

℞ Quininæ hydrobromatis, 1.33;
Pulv. Doveri, 0.65;
Pulv. acetanilidi co., 0.65;
Aloini, 0.33;
Pulv. capsici, 0.33;
Res. podophylli, 0.075.

M. fiat in caps. vel tabellæ No. X. S.: Adults take two tablets every three or four hours till the bowels act well, then four times a day till cured.

A very good internal remedy consists of equal parts of spirits of nitrous ether and aromatic spirit of ammonia, of which a teaspoonful is taken in an ounce of water, and repeated every four hours.

In the beginning an attack may be cut short by moderately large doses of quinine, opium, or the ammonium salts. The following combination is recommended in the early stages of the disease:

℞ Morphinæ sulphatis, gr. ⅛ or 0.008;
Atropinæ sulph., gr. 1/120 or 0.0005;
Pulv. ipecac. comp., gr. x or 0.65;
Quininæ sulphatis, gr. vj or 0.40.

M. fiat in caps. No. I. S.: One at bedtime, followed by a hot drink.

The attack may be cut short by administering spirits of camphor in 10-drop doses on a lump of sugar, or potassium nitrate in 5-grain (.30) doses, spirits ætheris nitrosi in 20-minim (1.30) doses, or a solution of ammonium acetate in 2-drachm (8.00) doses repeated from time to time. Preparations containing ammonium carbonate or ammonium chloride combined with liquor ammonii acetatis are recommended.

Camphor, gr. ¼;
Belladonna ext., gr. ⅛;
Quinine sulphate, gr. ¼.

Or the Edwards formula:

Atropine sulphate, gr. 1/500;
Aconitine, gr. 1/500;
Morphine sulphate, gr. 1/100;
Calomel, gr. 1/10.

Either of these may be taken hourly till a physiological effect is produced, and then less frequently.

Hygienic and Preventive Treatment.—Avoid too much animal food all the time. Meat but once a day. To the gouty the time-honored advice, "No red meat and no vegetables taken from the ground." Proper daily exercise. Proper care of the skin and the eliminative functions: this includes regulation of the bowels and the daily bathing in the morning. Good stout shoes should be worn with cork soles if necessary, and rubbers avoided unless in very stormy weather. Heavy furs and wraps should be avoided. The old saying that "sealskin sacques kill more people than the smallpox" is not far from the truth. Clothing next to the skin should be at least in part woolen. The Turkish bath has always enjoyed a high reputation for aborting coryza. If it be tried the patient must be kept indoors for some time, and if practicable should remain in the bathing establishment all night.

Vascular mechanism of the nose is somewhat unique, and a full understanding of it is called for in order to explain the sequence of various pathological changes. To the blood-supply of the turbinated bones does this observation apply with special force. The larger arterioles are well supplied with muscular coats and lie in the deepest layers of the mucosa close to the bone. These views of the anatomical structure are those of Zuckerkandl, who also reminds us that the arteries enter the nose through the various bony foramina along with the veins. If from any cause the artery dilates it must compress the vein against the bony wall. While therefore the inflow of blood from without is increased the outflow is diminished, and engorgement is the result, from two causes. Arterial contraction produces, of course, the reverse result.

In all prescriptions for recurrent coryza where you prescribe cocaine do not forget to add "Ne repetatur."

DIRECTIONS FOR DETERMINING THE OPSONIC INDEX OF THE BLOOD.

BY E. C. L. MILLER, M.D.,

Research Bacteriologist, Department of Experimental Medicine, Parke, Davis & Co., Detroit, Mich.

The subject of immunity is now being studied as never before. It is recognized to-day as the subject of paramount interest in medicine. Thanks to the genius of certain English workers, we are now able to make a quantitative determination of at least some of the factors which go to make up immunity. Heretofore the only test for immunity consisted in inoculating the animal with the germ in question, and from the amount of culture which it could withstand we tried to form some idea of the degree of immunity. Now we are able to separate the resisting factors of the body (cells and fluids) and measure *in vitro* their power to overcome the bacteria. The method is simple, and, fortunately, applicable to man as well as to the lower animals. This fact at once makes it of interest to the physician, for by this means he is brought one step closer to his patient's actual vital condition. Methods have also been discovered by which the degree of immunity toward any particular microorganism can be increased, and thus is placed in the practitioners' hands the means of treating disease by nature's own methods.

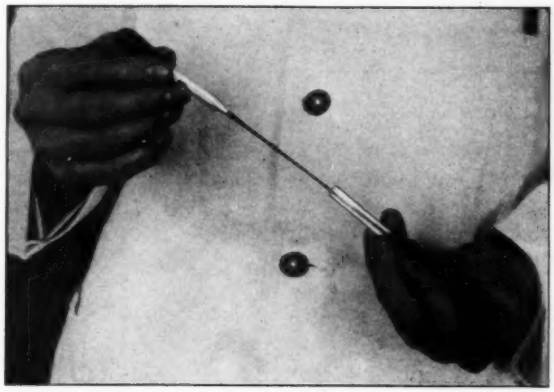

FIG. 1.—Emulsifying bacteria.

FIG. 2.—Grinding bacteria.

Having recently spent some time in Sir A. E. Wright's laboratory in London, it seemed that it might be of interest to readers of the GAZETTE to have in concise

form the methods employed by the pioneer in this line.

Preparing the Emulsion of Bacteria.—The culture of the germ in question growing on inclined agar is removed and emul-

FIG. 3.—Glass needle.

sified, the method of emulsifying depending upon the character of the germs, and upon the age of the culture. In a young culture (12 to 24 hours) of an easily emulsified germ it is usually sufficient to wash off the culture with 0.85 per cent salt solution and draw it up and down repeatedly in a pipette (see Fig. 1). In a culture less easily emulsified it may be necessary to grind the culture lightly. This is best done between two pieces of plain glass (see Fig. 2). In the case of bacillus tuberculosis the emulsion may be made from fresh culture, or from dry, dead tubercle germs. These need considerable grinding between the glass plates. After grinding and diluting the emulsion is centrifugalized to remove

FIG. 4.—Collecting blood for corpuscles.

the clumps of bacteria, and then tested for density by determining its phagocytic index when opsonized with normal serum. The proper consistency is one that will give a count of about two bacteria per leucocyte for tubercle, and a count of from three to five for other germs. The best strength of saline solution for diluting tubercle and gonococcus is 1½ per cent; the strength to use for most other germs is 0.85 per cent.

Preparing the Washed Blood-corpuscles.—Things required: An ordinary gauze bandage or a piece of light rubber tubing; 1½-per-cent sodium citrate solution; a special blood pipette; two blood capsules.

The capsules may be of various sizes and shapes, depending on the amount of corpuscles required, and upon the character of the centrifuge to be used. Fill two capsules three-quarters full of the sodium citrate solution; make a pricking needle by

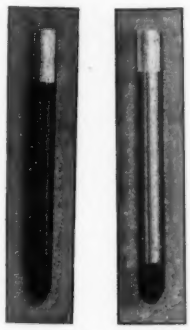

FIG. 5.—Tube of blood and citrate solution before and after centrifugalizing.

drawing out the long capillary arm of the pipette in a pilot flame; wind one finger centrifugally with the bandage or rubber tube in order to cause marked congestion in the tip of the finger. Prick the finger with the glass needle (see Fig. 3)—preferably at the root of the nail—and allow the blood to flow into one or both of the capsules containing sodium citrate solution (see Fig. 4). Mix the blood and citrate solution, and having balanced the tubes carefully, centrifugalize until the corpuscles are thrown down (see Fig. 5). Remove the supernatant sodium citrate solution carefully, and wash the corpuscles in 0.85-per-cent sodium chloride solution. Again centrifugalize and remove the saline as completely as possible. The last drop of saline can be best removed by inclining the tube and drawing the saline into a cap-

illary pipette from the back portion of the meniscus (see Fig. 6).

Directions for Preparing the Serum.—Bleed the finger, as before, allowing the free flow of blood. It is best made in the small pilot flame, provided with some Bunsen burners to keep the gas alight when the main flame is turned off. Hold the capil-

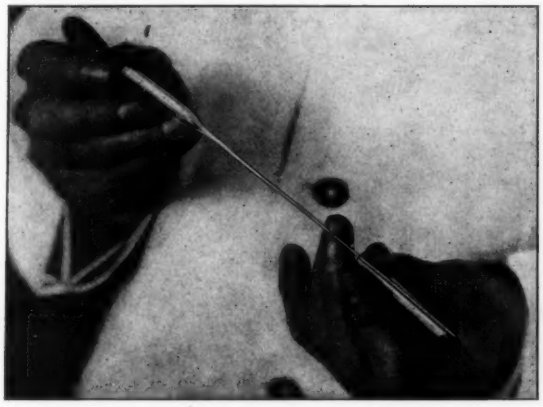

FIG. 6.—Removing last drops of saline solution.

blood to flow into the special blood pipette (see Fig. 7). Place the blood pipette in the incubator for fifteen to thirty minutes, and if the serum be not clearly separated by the end of this time, centrifugalize it.

FIG. 7.—Collecting blood for serum.

In obtaining blood for this work it is better not to squeeze or knead the finger. If the blood is to be transported some distance, it is well to seal off the end of the straight arm of the pipette in the flame, and after it has cooled to shake the blood down into this arm (see Fig. 9). In sealing it the body of the pipette should be grasped so as to protect the blood from the heat.

The glass pricking needle is thoroughly aseptic, causes very little pain, and gives a lary tube in this flame until it softens, then remove from the flame and rapidly draw the softened part out into a hair. Break off the flexible portion, and the sharp point remaining is the pricking needle.

Putting Up the Test.—Take up in an opsonizing pipette equal quantities of blood-corpuscles, bacterial emulsion, and blood serum in the order named, separating them by means of air bubbles (see Fig. 10). Drive the liquids out on to a slide

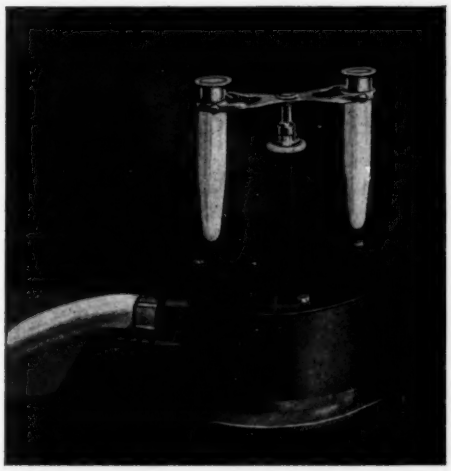

FIG. 8.—A convenient form of centrifuge for opsonic work.

and mix thoroughly (see Fig. 11). Take up in the pipette, seal the end in the flame, and incubate for fifteen minutes (see Fig. 12). In drawing the mixture into the

FIG. 9.—Pipette containing blood ready for transportation.

pipette for the final time, care should be taken to avoid air bubbles, as these interfere with phagocytosis.

In order to get accurately measured portions of the different fluids, the usual method is to make a mark with a wax pencil on the capillary portion of the opsonizing pipette, about 5/8 or 3/4 of an inch from the end. Then, by means of a rubber nipple on the other end, the blood-corpuscles are drawn into the capillary tube up to the mark. The pipette is then removed from the corpuscles, and the column of the corpuscles lying between the end and the mark is drawn up the tube a short distance, leaving an empty space at the end of the capillary tube. The suspension of bacteria is now drawn in up to the mark and remains separated from the blood-corpuscles by the distance the corpuscles were originally withdrawn from the end. In a similar way a portion of the blood serum is drawn in and then all are driven out and mixed. Beginners sometimes have difficulty in working accurately with an opsonizing pipette, but a little practice usually brings confidence and accuracy. Pushing the glass tube well up into the rubber nipple and grasping the glass tube through the rubber gives one a firmer grasp and a more delicate control over the column of liquid. Drawing the corpuscles in first helps, as they do not move as freely as the thinner liquids. Those who prefer can manipulate the pipette by mechanical means, as shown in Fig. 14. To avoid air bubbles when drawing the mixture into the pipette for the last time, have the end of the capillary tube square-cut and hold the pipette perpendicular to the slide.

Making the Smear.—Remove the opsonizing pipette from the incubator; break off the sealed tip; drive the contents on to a slide, and spread out into a film by means of a special spreader. The spreading is usually done by means of another slide, from which the corners have been broken off, in order that the smear may not cover the entire width of the slide (see Fig. 15). A good smear greatly facilitates the otherwise laborious work of counting, and each worker usually develops his own favorite way of accomplishing this result. Perhaps as good a form of spreader as any is one with the spreading edges sharp and smooth and the spreading end concave (about 1½ diopters). Such a spreader is brought in

FIG. 10.—Opsonizing pipette containing blood-corpuscles, bacterial emulsion, and blood serum.

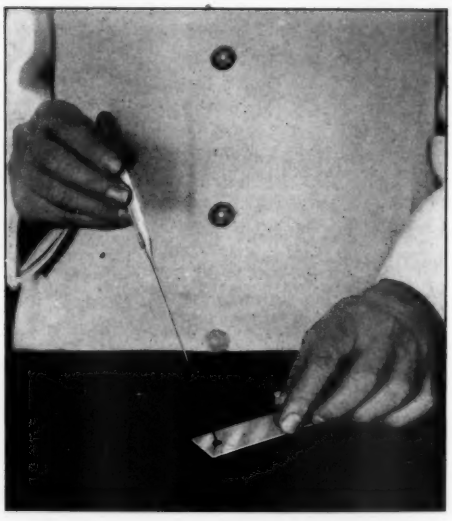

FIG. 11.—Mixing liquids by repeatedly expelling onto slide and redrawing into pipette.

FIG. 12.—Opsonizing pipette ready to incubate.

contact with the drop to be spread, rocked slightly to distribute the drop uniformly across the end of the spreader, and then, while held at an angle of about 30 degrees above the horizontal, is drawn along the slide until the drop is exhausted (see Fig. 16). The drop should not be so large as to extend to the end of the slide (see Fig. 17). A good smear should be uniform in consistency, and most of the leucocytes should be found along the edges and at

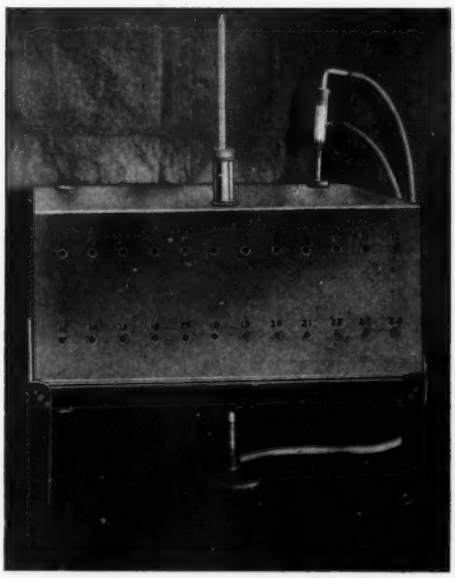

FIG. 13.—A small incubator of special design for opsonic work.

the end. For convenience in counting it is well to have the smear terminate abruptly, and not be drawn out into threads or irregular forms (see Fig. 18).

Staining.—Any good stain that brings out in sharp relief the bacteria and white blood-corpuscles can be used. For tubercle, carbol fuchsin with methylene blue as a counter-stain is usually employed. For staphylococcus and other germs, Leishman's or J. H. Wright's stain may be used. An important point is to stain all the slides for one opsonic test at once—that is, the slide made from the patient's blood and the one from the normal serum should be treated exactly alike in staining. Two rods of brass or of glass, about 2½ inches apart, supported over a sink, make a convenient

FIG. 14.—Screw control for opsonizing and other pipettes devised by Dr. W. H. Hutchings.

FIG. 15.—Spreader.

rack for staining (see Fig. 19). The slides are placed across these rods, and the fixing, staining, washing, etc., done to all at one time. A piece of filter-paper cut to proper size and laid on the slides serves the double purpose of filtering the stain

and of distributing it uniformly over the slides.

Method of Staining Tubercle.—1. Fix the slides in a saturated solution of corrosive sublimate. Wash.

2. Stain with carbol fuchsin about one minute (carbolic acid 5, fuchsin 1, water 100). The slides should be heated, while staining, until steam is given off. Wash.

3. Decolorize in 2½-per-cent sulphuric acid. Wash.

4. Treat for a few seconds with 5-per-cent acetic acid to reduce the prominence of the red blood cells. Wash.

FIG. 17.—The drop ready to spread.

5. Counter-stain with alkaline methylene blue (methylene blue 1, sodium carbonate 1, water 200). Wash lightly and dry.

Method of Using Wright's Stain.—Without any preliminary fixing, cover the film with the stain and allow to stand forty-five seconds. Add about two parts of distilled water, mix, and let it stain two minutes. Wash with distilled water and dry.

Counting.—The essential in counting is to set for one's self definite standards, and always adhere to them. Only typical polymorphonuclear neutrophiles should be counted. It is also well to use the same portion of the smear for counting, both for the patient's blood and for the control, as there is liable to be some difference in the count between those leucocytes found along the edges and those found at the end of the smear. It is also well to have some disinterested party mark the slides in cipher so as to eliminate any psychical error in counting. The average number of bacteria found in the phagocytes gives the phagocytic index. The phagocytic index of the blood to be tested, divided by the

FIG. 16.—Making the smear.

phagocytic index of the normal serum, gives the opsonic index.

Preparation of Bacterial Vaccines.—A culture of the bacteria in question, either from bouillon or preferably from inclined agar, is emulsified with physiological salt solution, either by grinding between glass plates or by shaking in a sealed tube with glass beads. The count is then made of the number of bacteria per cubic centimeter by mixing one part of vaccine, one of normal blood, and three of physiological salt solution thoroughly, and then making a smear of this mixture on a slide. This smear is stained, and then the number of bacteria and of red corpuscles in successive fields of the microscope are counted until at least 200 corpuscles have been counted. As the number of red blood-corpuscles per cubic centimeter is five thousand million, the number of bacteria per cubic centimeter

FIG 18.—The smear.

can be determined from the results of the counting by a simple arithmetical process. If the bacterial vaccine is very dense, it is well to take one part of vaccine and a sufficient number of parts of normal blood, so that the number of bacteria does not

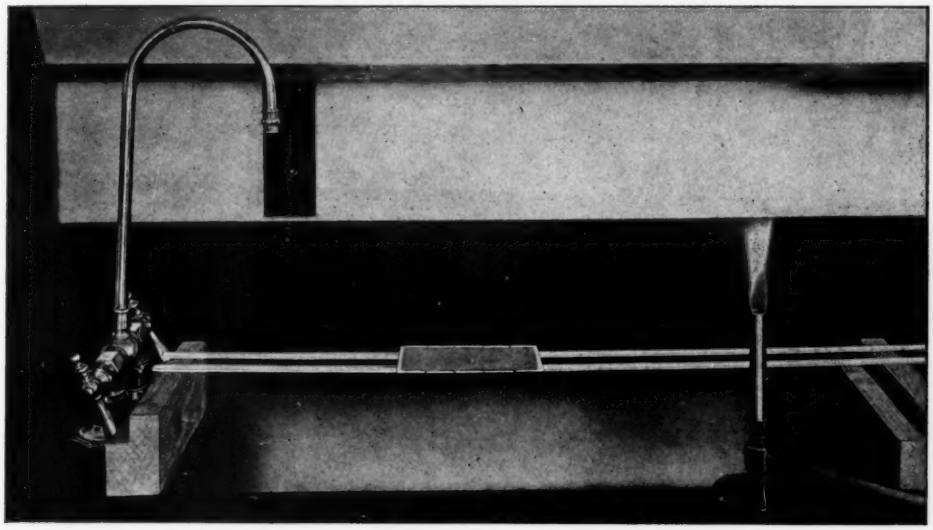

FIG. 19.—Staining rack.

differ greatly from the number of red blood-corpuscles. The vaccine can now be standardized by dilution to any required strength. The vaccine should then be preserved with lysol, or other antiseptic, and

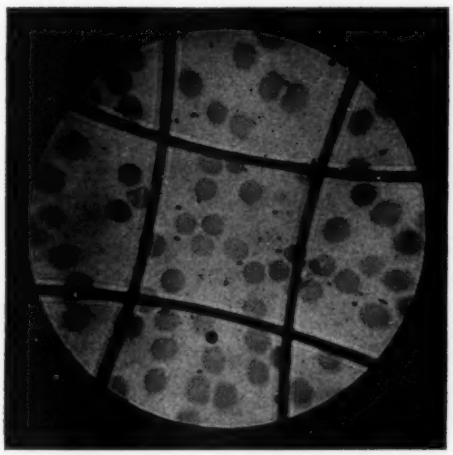

FIG. 20.—Photomicrograph showing cross-hairs, bacteria, and red blood-corpuscles.

killed and sterilized by heat and preserved in sealed glass tubes. In counting it is convenient to have the field of the microscope divided by cross hairs, as shown in Fig. 20. This can be readily accomplished by placing hairs on the eyepiece, as shown in Fig. 21. These hairs can be cemented in place by cedar oil, and then the diaphragm must be pushed up and down in the eyepiece until the hairs are exactly in focus.

In administering bacterial vaccines for therapeutic purposes, the frequency of administration and the size of the doses depend on the kind of vaccine used and on the patient. As a general rule, that dose should be given which gives the maximum of positive phase consistent with the minimum of negative phase. In round numbers, the doses frequently used for the various bacteria are as follows: Staphylococcus 300,000,000, pneumococcus and streptococcus 50,000,000, gonococcus 10,000,000, tubercle (T. R.) 1/3000 mg. to 1/800 mg. It is always best to begin with a small dose and work up, as some patients can stand two or three times as much as others.

Use of the Pool.—The opsonic index of a serum expresses the ratio which its phagocytic index bears to the phagocytic index of "normal serum." Normal serum in this sense would be serum that had never been influenced by the particular bacterium in question. Owing, however, to the limitations of our knowledge, this is quite an impractical standard, and hence resort is had to pooling the blood serum of several presumably normal persons. Each person is bled in the usual way, and after the

serum separates equal portions of the serum are taken and mixed. This mixed serum is the pool. If great accuracy is desired, each constituent serum should be tested against the pool, and those varying markedly from the pool eliminated. A new pool should then be made from the rest.

Cautions.—Samples of the blood designed for the opsonic test should be used as early as possible—they lose their opsonic power markedly after two or three days. The washed blood-corpuscles should be made up fresh. The bacterial emulsions should be made up fresh each time required, but a concentrated emulsion of tubercle may be kept in stock and fresh dilutions made from

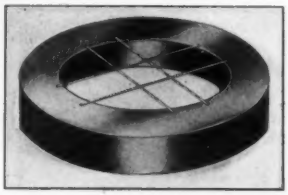

FIG. 21.—Diaphragm of eyepiece showing hairs in position.

this as needed. Each bacterial emulsion must be standardized by being opsonized with normal serum. Optical tests for the density of an emulsion are of value in that they enable one to dilute an emulsion to approximately the correct amount, but should not be relied on to take the place of the normal phagocytosis. The centrifuge used in preparing the blood-corpuscles should run without vibration, otherwise the phagocytes are liable to be disintegrated.

USEFUL STUMP AFTER AMPUTATION OF THE ARM.

The idea followed by CECI (*Presse Médicale,* No. 92, 1906) is to leave the tendons of the part in a loop outside of the stump but covered with skin, so that a strap may be passed under the loop and attached in such a way to the artificial arm that contraction of the muscle will make any one movement which may be preferred.

The author reports two successful operations. The first was an amputation just above the elbow. The operation was an ordinary circular amputation, except that instead of cutting through the muscles the insertions of the tendons of the biceps and triceps were separated from the bone and the ends of the tendons sewed together end to end, forming a loop below the bone. Two incisions were then made in the skin cuff laterally and opposite to each other. Each was 2 inches long and 1 1/5 inches from the free border, to which they were parallel. These incisions were brought together in the tendon loop and sewed so as to surround this and cover the stump inside of it. The free border was then sewed over the loop and a strip of gauze inserted in the loop to prevent adhesions. As soon as the scar was solid traction was exercised on the loop, and the patient could lift about four pounds with it. A stump has been fitted, and he can use a hammer well.

The second case was an amputation just above the wrist. This resembled a rectangular flap operation, but the tendons were cut lower than usual and the ventral and dorsal masses each divided into equal parts and sewed end to end in a loop as before, except that two loops were present. Two incisions were made in each skin flap, each one-fifth inch long and parallel to the free edge, one being four-fifths of an inch from that, and the other four-fifths of an inch higher. The two incisions in each flap were sewed together under the loops and the free edges of the flaps sewed together over the bone. In this way two loops covered with skin were made. In each loop was put a rubber drain. The traction on the loops was begun two months later, and an artificial arm was fitted in such a way that contraction of the palmar flap caused flexion of the fingers, and of the dorsal, adduction of the thumb. The opposed motions were made by the elasticity of the hand. The hand was most serviceable.

In applying the first dressings great care must be used to avoid pressure on the loops, as their blood-supply is not good and there is a tendency to sphacelation. The dressing must be changed daily, and for this reason a rubber drain is better than gauze to put under the loops.

EDITORIAL.

THE TREATMENT OF PLEURAL EFFUSION.

As is well known to our readers, increasing experience has taught the profession, particularly during the last few years, that it is unwise to permit pleural effusions to exist over long periods of time, and should nature fail to cause a disappearance of the effusion within a very short period after it is formed, it is generally thought that the physician should remove it by the methods which are universally regarded as correct for this purpose. An invariable rule of practice is, of course, to remove the fluid should it by its pressure cause dyspnea or interference with cardiac action, but there is another large class of patients in which the effusion produces practically no objective or subjective symptoms, except on exertion, in which cases very large accumulations of fluid may exist for long periods of time without being recognized. The greater number of pleural effusions which require treatment by instrumental means depend upon an infection of the pleural membrane and not upon simple transudation, and it is to be remembered that most of these cases depending upon infection have present not only fluid in the pleural cavity but a considerable formation of lymph exudate over the surface of the pleura, which renders absorption slow or impossible. In other words, this associated pathological state teaches us that purgatives and diuretics can do little in dissipating pleural effusion because of the local condition.

After an effusion has been present a week or ten days, in the minds of some at a much earlier date than this, it should be withdrawn. The two methods of withdrawal consist in the supposedly simple method of siphonage and the more commonly resorted to method of aspiration. Both of these procedures have been followed in a large number of cases, but the general opinion seems to be that aspiration is usually the better method. In the employment of aspiration, however, there are a number of facts which are often overlooked which deserve attention. It is the custom of many physicians in using the aspirator to produce a very considerable vacuum in the aspirating jar before the fluid begins to flow, with the result that it runs out of the chest with great rapidity, and because of this the lung expands much faster than is desirable. At the same time syncope or other circulatory symptoms may develop as the result of removing pressure from the great vessels of the thorax.

An article by Capps in the *Journal of the American Medical Association* of January 5 serves to emphasize this fact. He has carried out a series of experiments in which he has made estimations of general blood-pressure in connection with the removal of pleural effusion. Prior to the operation a rise takes place because of the excitement incident to preparation, but as the fluid is withdrawn the blood-pressure falls constantly, amounting, as a rule, to not less than about 20 millimeters of mercury. The amount of fluid withdrawn is, of course, an important factor in causing the degree of the fall in pressure, as is also the rapidity of the withdrawal. Thus slow aspiration causes much less fall than rapid aspiration. He also found that in long-standing cases the fall in pressure caused by aspiration is greater probably because the thoracic contents adjust themselves very slowly as the fluid is withdrawn.

In this connection two other papers dealing with this subject are of considerable interest. One is by Forchheimer, of Cincinnati, in the same issue of the same journal, in which he asserts that in his belief practically no contraindications for thoracentesis exist, and furthermore the danger of removing fluid from the chest, although always insisted upon, can be reduced to a minimum if the operation is done with care. Personally he has never seen a bad result, but he insists upon the need of using a low vacuum in the withdrawal, and he also reminds us that not infrequently the removal of a small

quantity of fluid, perhaps by diminishing intrathoracic pressure, is not infrequently followed by a rapid absorption of the fluid. He also insists upon the patient being as nearly as possible in the recumbent position, and in the aspiration being stopped if violent coughing or faintness comes on. The other paper to which we refer is that of Sears, which appeared in the *American Journal of the Medical Sciences* for December, 1906. Sears speaks of a number of accidents following thoracentesis. It has been thought by some that in those cases in which serious cardiac difficulty has arisen the aspirating needle has entered the lung and damaged a fiber of the vagus. In other instances pneumothorax has followed puncture of the pulmonary tissue, the physician having made an error in diagnosis and mistaken a pulmonary consolidation for a thoracic effusion. Even when this mistake is made, however, pneumothorax does not always ensue, and as a matter of fact Sears has only been able to collect a comparatively small number of cases of serious accident. The same writer advises that where the effusion is a large one, and particularly if it has existed for a long time, the method of Forlanini, namely, the introduction of some sterile air into the thorax in place of the fluid, is advisable, as this form of pneumothorax is not disadvantageous and prevents too rapid expansion of the tissues which have been compressed by the effusion.

THE RELATIVE VALUE OF THE SALTS OF SILVER.

For many years, before the importance of bacteriology as a branch of medicine was recognized, practical physicians knew that solutions of the nitrate of silver possessed valuable curative properties in certain inflammatory conditions, more particularly in the eye and in the urethra, which we now know to be due to various forms of infection. During the last ten years a large number of salts of silver have been introduced by various manufacturers with the object of providing substances which would be equally efficacious and which would not possess the irritating properties of the ancient nitrate. Increasing experience in regard to these substances has pretty definitely determined that none of them equal the nitrate in therapeutic value, although in certain cases they have a distinct therapeutic usefulness. Our attention is called to this matter by an interesting contribution made by Dr. George S. Derby, of Boston, to the *Boston Medical and Surgical Journal* of September 27, 1906 (see also de Schweinitz in THERAPEUTIC GAZETTE for January, 1907), in which he reports his results in determining the bactericidal power of the numerous silver preparations. He tested argyrol, protargol, collargol, largin, ichthargan, albargin, argonin, and argentamin. It is claimed for most of these newer preparations that they do not precipitate in the presence of albumin. He used nitrate of silver to a certain extent as a control. As is well known, the nitrate of silver salt forms dense precipitates in albuminous and saline fluids, but is an efficient germicide in solutions varying in strength from one-half to two per cent. Derby found that, with the exception of argyrol and collargol, the various silver preparations named are efficient bactericides in the laboratory, but that their bactericidal properties are markedly retarded by the introduction of bovine blood serum—in other words, in the presence of albumin they fail.

He considers that all these preparations of silver may be divided into three classes: The first, those non-irritating ones of low bactericidal power, such as argyrol and collargol; secondly, the more effective and slightly irritating bactericides, such as protargol; and thirdly, the very irritating preparations like nitrate of silver, which act in two ways—as bactericides and as cauterants, the value depending, to a large extent, on the reaction which they set up.

It is interesting to note that in one sense Dr. Derby favors the weak argyrol rather than some of the more active preparations which he has tested, not because he relies upon argyrol as a germicide, but because, as he expresses it, it is an almost inert solution in these respects, but is nevertheless sterile and soothing, and mechanically

washes away the pus, certainly doing no harm, and permitting nature to do her best. But he asks the question, Would not normal salt solution be as efficient and less objectionable?

It must be remembered in this connection that the body has natural powers of protection of its own which should be relied upon largely in a great many conditions, and it is not only conceivable but it is also a fact that very powerful bactericides may seriously interfere with these natural processes. As a matter of fact it would seem that in many instances it is best to employ normal salt solution for ordinary purposes, and to resort to the old-fashioned nitrate of silver solutions when any severe infection is to be overcome.

ETHYL CHLORIDE AS A GENERAL ANESTHETIC.

From time to time we have published in the Progress and Editorial columns of the THERAPEUTIC GAZETTE information in regard to the usefulness of this comparatively new anesthetic. It seems to be pretty well decided that it is by no means as safe as it was at one time thought to be, and that it occupies a position between chloroform and ether as to its danger, although it approximates the danger of chloroform much more closely than it approximates ether, various statistics giving the death-rate at from 1 to 2500 to 1 to 8000 of cases anesthetized. In all probability the lower percentages are incorrect, for it is rare for an anesthetist to report in the medical journals every untoward effect or even every death which he may have under the influence of a drug, and we know of one instance at least in which sudden and unaccountable death occurred from ethyl chloride of which there is no record in medical literature. On the other hand, it must be remembered that anesthetics are often given to patients who are suffering from such grave diseases that a very slight variation from the ordinary course of their lives may result in sudden death, the discredit of which is given to the anesthetic, when, as a matter of fact, going up a flight of stairs or eating a hearty meal might have produced death with equal rapidity.

In the *British Medical Journal* of November 10, 1906, Daniell writes in an entertaining way of the use of ethyl chloride as a general anesthetic in conjunction with ether. He believes that a certain number of accidents are due to a want of experience on the part of the administrator, and he calls attention to the fact that just as much skill is required in the administration of ethyl chloride as in the administration of chloroform. He advocates the use of ethyl chloride for a short time to be followed by the use of ether. His views are of great value. Daniell is modest in stating that although he has given ethyl chloride about two thousand times he does not consider that he has had a sufficient number of cases to justify him in giving statistical results. The idea is to administer the ether as soon as the primary anesthetic effects of the ethyl chloride are present. He rarely employs more than 2½ cubic centimeters of ethyl chloride.

WHAT IS THE INFLUENCE OF ALCOHOL ON HEPATIC GLYCOGEN?

Although the question which heads this editorial note does not possess any direct interest to the general practitioner, it is worthy of notice because all investigations which aid us in determining the value of alcohol in medicine should receive careful attention on the part of medical men. Very recently in the *Journal of the American Medical Association* Salant has reported a number of experiments made with the object of determining the correct answer to the following propositions:

(*a*) Does alcohol, on account of its high calorific value, spare the glycogen of the liver and thus retard its disappearance? Or

(*b*) If it fails to do so, does alcohol behave like other various toxic substances in this regard, and accelerate the disappearance of glycogen from the liver?

His reply to the first question is an expressed belief that alcohol does not spare hepatic glycogen, and his conclusion in regard to the second question is that large

quantities of alcohol hasten the process by which glycogen is made to disappear from the liver, although this action is apparent only after the stage of intoxication has been passed.

The first point that strikes us in a consideration of these studies is a matter which we have noted on previous occasions, namely, that the quantities of alcohol which were used in these experiments are so far in excess of the quantities which were ever given for medicinal purposes that the results obtained are of very little value. Thus, we find that the doses of alcohol were sometimes as high as 12 to 15 cubic centimeters of 60-per-cent alcohol per kilo; in other words, about 3 or 4 drachms to a little more than each two pounds of the animal's weight, which would be equivalent to 300 drachms or 37 ounces, or more than 2 pints of whisky, for a man weighing 150 pounds. That the quantities of alcohol in the experiments were also far in excess of those which can be compared to ordinary doses is proved by the fact that several experiments are cited in which the animal, when killed, was in a state of deep intoxication, and in one instance the animal actually died from the quantity of alcohol which was administered. We do not think therefore that these experiments can be utilized to judge of the influence of alcohol in medicinal doses, nor can they in any way govern our employment of this drug for the purpose of combating infectious diseases.

MODERN SURGERY OF THE KIDNEY.

Although many practical surgeons still remain skeptical as to the aid which can be rendered by laboratory research, and skill in the use of modern instruments, Kümmell (*Surgery, Gynecology, and Obstetrics,* January, 1907) is not to be numbered among these. Indeed, he may be ranked as perhaps overenthusiastic; but scarcely this if his statement be accepted to the effect that whereas in former years he experienced one fatal outcome in six cases of extirpation of the kidney on account of absence or insufficiency of the other organ, there has not been a single death from such a cause among 148 nephrectomies where an accurate application was made of the newer diagnostic helps.

The successful practice of modern surgery of the kidneys, he believes, depends upon the *x*-ray, the cystoscope, the ureteral catheter, and upon methods of functional examination, notably cryoscopy.

In regard to the *x*-ray it is held that every stone in the kidney becomes visible on a good plate if the proper technical precautions are observed; if the plate fails to show a shadow stone is not present. Among 84 operations for renal calculi 65 gave perfect *x*-ray pictures of stone corresponding exactly to the specimens removed. In an equally large number of cases in which, clinically, there was a possibility of calculus though the *x*-ray gave negative results, operation disclosed other conditions.

Without regard to the state of nutrition of the patient or the chemical composition of the stone, a carefully selected position, a good soft tube, and a well-adapted diaphragm will, if several skiagrams be made, indicate with absolute certainty the presence or absence of the calculus. For the correct interpretation of the *x*-rays proper illumination is essential. The picture should be examined in a dark room, placing it in a cabinet which should be lighted with greater or less intensity, and sometimes opera-glasses, are necessary that the pictures may be seen at a greater or less distance and that the delicate shadows may be interpreted with greater certainty.

In so far as ureteral catheterization is concerned, Kümmell feels that no one who has mastered this technique will oppose it, nor has any such seen bad results from its application. In children ureteral catheterization is often difficult because of the narrowness of the ureteral lumen.

Simple cystoscopy is serviceable in the absence of ureteral catheterization, since it shows the presence of the ureteral openings, allows an inspection of the character of the fluid escaping from each, and will usually lead to an inference as to which of the two kidneys is diseased, this being particularly

true in regard to tuberculous nephritis. The segregator should be used only when it is impossible to catheterize the ureter.

The determination of renal function, a matter of vital importance to the surgeon proposing operation upon one or both kidneys, is held by Kümmell to be best determined by cryoscopy. He has in the last five years undertaken a methodical determination of the freezing-point of the blood and of the urine, his researches including more than a thousand cases. The method is based on the idea that the function of the kidney is osmotic and that its work may be calculated from the product of the gland—*i.e.*, the urine, and its source, the blood serum; and that these two fluids, the solvent of which is water, are subject to the laws of osmosis. By osmosis is understood the changing relations between two chemical solutions of different concentrations which have for their purpose the equalization of these differences of concentration.

It has been demonstrated that there is an increased concentration of the blood if there is kidney disease, and that with the increase of the osmotic concentration of the blood there is a corresponding decrease in the osmotic pressure of the urine. While the kidney function is normal all nitrogen-containing molecules will be excreted by the kidney, while if there be a disturbed kidney function a retention of nitrogenous compounds in the blood will occur.

The osmotic concentration is determined by the lowering of the freezing-point. "The determination of the freezing-point is carried out with the Beckmann apparatus. This consists of a fine thermometer with 100 divisions, each of which is again divided into 100 parts. The thermometer is immersed in a glass cylinder in which the fluid to be examined is kept in constant motion by a platinum rod. The glass cylinder, with the thermometer and fluid, is placed in a freezing-mixture at a temperature of minus four degrees Celsius. Whilst being constantly stirred there is a moment when the fluid congeals. By the change from a liquid to a solid state heat is liberated, which permits the column of mercury to snap up to a certain point, where it remains stationary for a time; this is the physical freezing-point. In a similar manner the freezing-point of distilled water is determined. By subtracting the figure obtained by the freezing of the solution from that obtained by the freezing of water, there is obtained the figure which shows how much lower the solution freezes than distilled water. In the case of blood there is a difference of 0.56° C. The sign chosen for this is a small Greek *d* (δ); the capital Greek *d* (Δ) designates the freezing-point of urine." Twenty to fifty cubic centimeters of blood is obtained by means of a hollow needle thrust into a partially congested arm vein. This is caught in a glass cylinder which is to be used for the examination, is defibrinated by stirring with a platinum rod, and is then examined for its freezing-point. In the second cylinder the freezing-point of water is determined each time to test the thermometer. Kümmell states that with sufficient practice the examination can be made in from fifteen to twenty minutes.

As to the practical deductions obtained from 1200 cases examined in regard to the freezing-point, it is noted that with undisturbed renal function the molecular concentration of the blood is ever constant, this not materially changing in acute diseases, providing the kidneys remain intact. In all cases in which there is extensive bilateral kidney disease the freezing-point of the blood is lowered below 0.58°; the majority of the figures vary between 0.60° and 0.65°. In a number of cases the beginning of a uremic attack was strikingly indicated by a lowering of δ Coincident with this increased concentration of the blood it was usually possible to demonstrate a decrease in molecular concentration of the urine (Δ), the figures varying between 0.9° to 0.3° and 0.2°. Neither in pneumonia nor in uncompensated heart disease has Kümmell been able to show increase in blood concentration, though Koranyi in his first publication noted that in these conditions there was often a marked lowering of the freezing-point. In fever with nor-

mal kidneys the freezing-point of the blood may be elevated by 0.002° to 0.003°, which does not indicate disturbed kidney function. In eclampsia there is a freezing-point of 0.60°. Large kidney tumors gave a freezing-point of 0.60°. Kümmell criticizes the methods of cryoscopic examination employed by Rovsing and Koch, and points out that these methods are not calculated to give uniform or intelligible or practicable results. He holds that according to his experience a freezing-point of 0.6° marks the limit beyond which it is extremely hazardous and inadvisable to remove a kidney, and cites several cases apparently proving this proposition. The nephrectomies shown to have a normal freezing-point before operation invariably demonstrated postoperatively that the kidney which was left was functionally adequate.

As to cryoscopy of the urine, this when applied to that taken from the bladder, *i.e.*, from both kidneys, is without value. When, however, the urine of each kidney is obtained by ureteral catheterization determination of its freezing-point, together with examination of urea, may throw greater light upon the subject. Reflex anuria is by Kümmell not accepted, he holding that when this occurs it is always a sign of bilateral disease.

In differential diagnosis he regards cryoscopic examination as of great importance, particularly in determining between stone in the kidney and hemorrhagic nephritis with unilateral pain. An increase in the molecular concentration of the blood to 0.65° and a simultaneous and permanent decrease in concentration of the urine will necessarily prove that there is bilateral disease.

Kümmell notes that in numbers of cases of back pressure from enlarged prostate the concentration of the blood is high, having been noted to 0.71°, and in accordance with the general principles of his paper advises against operation when the freezing-point is below 0.6°, a piece of advice which but few surgeons would be inclined to follow.

Kümmell's method of examination after having obtained a history of the case and after palpation is to have the urine gone over thoroughly, this being followed by cystoscopy and by catheterization of the ureters. The urine from each kidney is examined as to its urea content and its freezing-point is determined; moreover, its concentration is often measured by its electrical conductivity, and the results obtained from the two organs are compared. The urine is examined bacteriologically, microscopically, and chemically in the usual way, and this is followed by cryoscopy of the blood, and by the *x*-ray picture if calculus is suspected. Indigo-carmine injections are sometimes used as a method of locating the ureteral openings where these are difficult to find.

Where these examinations disclose the probable existence of one diseased and one healthy kidney cryoscopy of the blood, if it shows normal freezing-point, will indicate with great certainty the adequacy of the remaining healthy kidney. Even when there is evidence of involvement of both sides, but one to a much less degree than the other, if the freezing-point of the blood be normal, Kümmell holds that the evidence is present to prove that the partly diseased organ is still capable of eliminating with sufficient activity to preserve life. When ureteral catheterization is impossible cryoscopy is particularly valuable as indicating the advisability of radical operation after opening down on the suspected side, since the normal freezing-point of the blood indicates removal of the kidney if this be found extensively involved, while a freezing-point below 0.6° contraindicates removal even though there be found extensive disease. Kümmell closes his valuable, almost convincing, eulogism of cryoscopy as follows:

"Among the methods of determining the kidney function, cryoscopy has proved itself of the greatest value, and with the proper care in technique has never failed us in over one thousand examinations. Cryoscopy is not intended to displace any other method, especially not ureteral catheterization, but even in those cases in which the other methods are inadequate it

is of complementary value, and has so proved itself. On account of its relative simplicity and its accuracy in determining the renal function, I hope that this valuable method may receive a wider recognition and a more universal application."

PRACTICAL VALUE OF EXAMINATION OF THE FECES.

It is only in recent times that either the practitioner or the surgeon, at least in this country, has considered an examination of the feces of sufficient importance to make it a routine measure. In cases of subacute pancreatic disease examination for excess of fat, which in itself is not necessarily characteristic, has been practiced for many years. Visible blood, if constantly recurring, has always been regarded as a valuable symptom from the surgeon's standpoint, and the same may be said of the absence of bile pigments in the fecal discharge.

Roberts (*New York State Medical Journal*, January, 1907) contributes an extremely valuable article embodying not only the technique of fecal examinations but the practical deductions to be drawn therefrom. He appreciates the difficulty incident to such examinations, since findings which may be pathological for one diet may be normal for another. He has formulated what he calls a standard intestinal diet, giving this in detail and in such measurements as are readily applicable in the ordinary household. The quantity and variety of each of the three daily meals are laid down. Immediately before the first meal a capsule containing 5 grains of carmine or a tablet of charcoal is given. At the end of the second day another dose of coloring is administered. Thus the entire feces resulting from the diet are demarcated. Judging from the appearance of the first color the time of passage is estimated.

An examination is started with careful macroscopic inspection. Roberts holds that the annoyance of weighing the dejecta is not compensated by any knowledge gained therefrom, and notes that the bodies of bacteria make up about one-third, and the débris of secretions and intestinal mucosa about one-fourth, of the solids of the feces under normal conditions, the remaining portion, about one-third of the solids, being the residue of foodstuffs ingested. Therefore it follows that daily stools measuring well up to the normal bulk may be expected, even though the individual be on greatly reduced diet.

The consistence of stools is of importance only if the diet be considered. This is normally semiliquid after the ingestion of an overabundance of fat or fresh vegetables, or the taking of an excessive quantity of fluid. Unformed stools in the absence of such diets, if individual idiosyncrasy be excepted, are pathological.

Fluid stools are due either to failure of water absorption from deficient absorptive powers of the mucosa, or too rapid colonic peristalsis, or to the addition of fluid from the intestinal walls in the form of serum, pus, blood, or mucus. Very watery stools are due either to failure of water extraction or the addition of serum. In the transitory diarrheas due to intestinal irritation or nervous excitation there exists hyperperistalsis characterized by frequent defecation with small fluid evacuations, which may be very foul. When the fluidity is due to the addition of serum, as in acute serous colitis, each passage is copious, is whitish and frothy, and with a little odor.

Abnormal hardness of the feces should be attributed to deficient fluid ingestion or prolonged retention.

The form of solid stools is often suggestive, since decrease in caliber if persistent points to spasmodic or organic contracture at some point from the cecum to the anus. High contractures cause cylinders of small caliber passed with softened feces. Ribbon-shape stools are commonly due to contracting conditions about the anus. Small balls of fecal matter may pass in either spastic or atonic conditions, whilst the large balls indicate an atonic condition of the colon and usually dilatation of the rectum.

The color variations are wide within

normal limits, being greatly dependent on the diet. Carbohydrates tend to lighten the color, whilst a meat diet produces a dark color, greatly exaggerated if the time of passage be prolonged, if the putrefactive process be abnormal, or the mass be exposed to the outside air after passage. Cylinders dark on the outside and light inside probably remained for a long time in the sigmoid or rectum.

Fresh blood is obtained usually only when this comes from the rectum or sigmoid, though if there be free bleeding from high up associated with exaggerated peristalsis, the characteristic blood color may be found in the stools. A fat diet may physiologically cause clay-colored stools without biliary failure. Moreover, it sometimes occurs that the bile is reduced to a colorless bile salt in the intestine; then the chemical examination is needful to positively determine whether absence of the normal color be really due to absence of bile.

The green stools of infants may exceptionally be due to the growth of a chromogenic bacterium, but a greenish hue results from increase in the peristaltic rate, since during the first year of life the changing of bilirubin and biliverdin to urobilin is not complete when the mass reaches the cecum, as is the case in later years. Even in normal peristalsis a green tint after exposure of the infant's feces to air is natural.

If on macroscopic inspection mucus is found in the stool, this constitutes evidence of inflammation of the intestinal tract, there being only two exceptions to this rule: the first is in the form of a thin, glistening coat of mucus on a hardened cylinder of fecal matter due to a somewhat long retention within the rectum. The true cause of this mucus is evident if a softer mass fails to show such mucous coating. The second exception is found in the seemingly mucous masses of membranous colitis, which in fact is not a true inflammation.

An evacuation of pure mucus indicates a catarrh of the descending colon, sigmoid, or rectum, accompanied by defecation so frequent as to prevent fecal admixture from the bowel above. With subsidence of inflammation fecal matter is added to the mucus, but not intimately mixed with it. When there are frequent passages of thin feces, with small masses of mucus, in lumps or shreds, intimately mixed with the feces, there is acute inflammation of the upper and lower portions of the colon. The higher the site of inflammation the finer will be the subdivision of the mucus, and the more intimately will it be admixed with feces. Its detection then necessitates the use of what Roberts calls the "glass plate" test. Small fecal portions are rubbed up with water, and spread out between glass plates of liberal size. If these be held to the light very small particles of mucus are discoverable. He notes that mucus from the upper part of the colon and the small intestine is not ordinarily distinguishable with the naked eye.

In acute catarrhal inflammation of the lowermost portions of the colon a few flakes of blood may be seen, but when there are evident streaks of blood intimately intermixed with the mucus an ulcerative condition is indicated. The presence of purulent fluid mixed with the mucus has a like significance, but indicates a deeper destruction of tissue.

The passage of large shreds of tough exudate resembling diphtheric membrane rather than true mucus is attributed not to inflammation but to a secretory neurosis of the intestines. Roberts notes that these shreds and casts may be found in the feces without a history of true intestinal colic being given.

After completion of the macroscopic inspection a small portion of the stool is removed from the mass for microscopical and chemical examination; the remainder is washed in the stool sieve until only the insoluble and odorless residue remains. This residue from a twenty-four hours' collection on the "test diet" amounts to less than a teaspoonful under normal conditions. Under the microscope the search for mucus is continued. Its appearance in the form of tiny lumps or shreds indicates a catarrh of the small intestine or first portion of the colon; if greenish in appearance the former

origin is certain. Connective tissue fibers are normally present in small numbers. An excess indicates a deficiency of gastric digestion. Muscle fibers with striations faint or entirely lost may be found in small numbers normally. If, however, the pancreatic secretion is lacking in activity the microscopic fields will be covered with large and small fibers in different states of destruction. Both connective tissue and muscle fibers are in excess.

The fat is estimated by heating a few drops of feces with acetic acid and estimating the number of fatty acid crystals. Moderate increase above the normal may have no significance, but the specimen that is of importance is seen to be greasy when spread out between slide and cover-glass, showing abundant droplets of fat, and the crystals cover the entire preparation. True fatty stools may result from overabundance of fat in the dietary, exclusion of bile from the intestine, deficiency of pancreatic enzymes, or atrophic changes in the intestinal mucosa, leading to failure of fat absorption. Excess of fat and exclusion of bile are readily determined, and atrophic conditions of the bowel are rare except in general amyloid disease; fatty stools then, in the absence of these other etiological factors, point to organic or functional disturbance of the pancreas. Under such circumstances meat fibers are also passed in great excess. The combination is not infrequent in certain cases of diabetes mellitus.

The use of a few drops of the feces for the sublimate test is sometimes of value when studied microscopically. The sublimate test is made by adding to 5 grammes of feces contained in a test-tube an equal amount of saturated solution of mercuric chloride. This mixture is allowed to stand for twenty-four hours. After the bile is excluded from the intestine the normal pinkish-red color is absent. Particles stained by the bilirubin become green, and such a reaction shows that the particles have come from the small intestine without a normal reduction to urobilin. Particles stained with biliverdin are shown in the fresh specimen, and have a like significance.

The test for occult blood is of great value, since a constant negative reaction may prove a deciding factor in distinguishing between gall-bladder disease and ulceration of the stomach and duodenum. In any severe vomiting there may be a small amount of blood. A negative reaction of the feces makes it improbable that an ulceration is responsible for the occurrence of the trace of blood in the vomitus. A positive reaction for occult blood in the stomach contents must always be viewed with suspicion if there is much retching attending its expulsion, or if the amount of stomach contents obtained is so small that a trifling amount of intermixed blood could be shown by the test. The turpentine-guaiac test for blood is the one which is most readily applicable and certainly sufficiently delicate for practical purposes. Since the reaction is due to the hemoglobin derivatives it will prove successful when microscopic examination for blood-corpuscles is negative. The fecal mixture is stirred with a third of its volume of glacial acetic acid and the mixture shaken with ether. One or two teaspoonfuls of this is poured into a test-tube, to which are added 10 drops of a freshly made tincture of guaiac and 20 drops of oil of turpentine. Violet or blue coloration denotes the presence of blood. For the surgeon's purpose this test is perhaps most important of all those given by Roberts, since it is well recognized that chronic ulcers of the large bowel, particularly carcinoma, are prone to remain almost completely latent until obstructive symptoms of such severity as to call for surgical intervention develop. When such symptoms have appeared the time for curative operation is likely to be long past.

The constantly recurring presence of blood in the stools in the absence of meat diet, anal lesions, or hemorrhages from the nose, mouth, or pharynx, should lead to a careful search for the presence of an ulcerating lesion, which if located may enable an operation to be performed under conditions which will not only give the best assurance of immediate recovery, but also of permanent cure.

REPORTS ON THERAPEUTIC PROGRESS.

A CONTRIBUTION TO THE HISTOPATHOLOGY AND THE THEORY OF DRUG ERUPTIONS.

As a result of a study along the lines indicated in the above title, ENGMAN and MOOK in the *Interstate Medical Journal* for November, 1906, state their views as follows in regard to iodine and bromine eruptions:

1. The local eruptive phenomena are prone to occur at points of previous inflammation; about comedones, acne lesions, seborrheic lesions, scars, traumata, scratches, etc.

2. Traumata, pressure, quick changes of temperature may precipitate an eruption in tissues charged with the drug.

3. Idiosyncrasy or susceptibility may be admitted, as it is in other toxic conditions.

4. The glands or follicles of the skin take no active or specific part in the production of the lesions, and when they are involved it is secondary and passive to inflammatory changes about the vessels and in the connective tissue.

5. The gross histological changes in the skin consist in different degrees of inflammation, from slight changes about the vessels to destructive abscess formation and progressive death of tissue.

6. The minute histological changes or steps to this end may be classed in the following stages: First, increase of connective tissue cells about the vessels. Second, appearance of lymphoid-like cells about the vessels. Third, addition to these cells of trifold leucocytes with granular appearance of collagen, and vacuolation of fixed connective tissue cells. Fourth, local increase of all these phenomena and the formation of an abscess.

7. The first and second conditions are found in the normal skin with iodide eruption.

8. The stages three and four, or the addition of leucocytes and degenerative changes, is induced by local disturbance of the normal equilibrium between the iodine combined in the serum and the tissues.

9. This disturbance of equilibrium may be induced by various factors, and when it does occur the resultant product acts as a toxin, which in its turn causes tissue irritation and the production of various local inflammatory symptoms, the type of symptoms and the eruptions being dependent upon the character of the individual's reaction to the inflammation thus produced, as in any other toxic condition.

10. This theory may be termed the "rational theory," as it explains all the symptoms of iododerma and bromoderma in a purely rational, chemical, and mechanical manner, and does not depend in its elucidation upon the mysterious or purely theoretical action of the vasomotor system.

THE TREATMENT OF GASTROPTOSIS.

FENWICK tells us in the *Edinburgh Medical Journal* for November, 1906, that much can be accomplished in the prevention of gastroptosis by careful attention to the clothing and the early correction of those conditions which are commonly responsible for its development. Young girls should never be permitted to wear tight corsets, and at all ages tight lacing should be prohibited. For a similar reason, strings and bands worn round the waist should be avoided, and buttons substituted for them whenever possible. During the lying-in period, special attention should be bestowed upon bandaging the abdomen, so as to afford a firm support to the viscera and aid the belly to regain its former shape. Any attempt to regain the figure by tight lacing should be discouraged, since the chief effect of the corset is to force the stomach and intestines downward, while it fails to afford any support to the parietes below the waist. Care should also be taken to reduce the gaseous distention of the bowels that usually occurs after delivery, and to overcome the natural tendency to constipation. The patient should never be allowed to walk before the tone of the abdominal muscles has been

restored. The same rules apply to persons who have undergone abdominal operations, and to those cases in particular in which the intra-abdominal tension has been suddenly lowered by the removal of a large tumor or an excess of fluid. The treatment of the dislocated stomach itself is a purely mechanical one. In mild or recent cases, confinement to bed for a month is invaluable, as it not only tends to cut short the progress of the complaint, but completely relieves the symptoms which emanate from it.

Rest cures also act advantageously, since the patient is forced to occupy the recumbent position; while an excess of nourishment leads to the accumulation of fat in the abdomen. Under all conditions, persons suffering from gastroptosis should be advised to lie down for an hour after meals, and at the same time to loosen the corsets and clothing round the waist. By this simple procedure the symptoms that ensue during the period of digestion are rendered much less severe, and stagnation of the food is to a great extent prevented.

Lavage is of no value unless the condition is complicated by gastrectasis and chronic gastritis, nor in ordinary cases do massage and electricity produce any direct effect upon the stomach. As a means, however, of strengthening the muscles of the abdomen they are often extremely useful.

The essential factor in the treatment is the application of a firm belt to the abdomen, which will support the stomach and hold it in position. Numerous varieties have been devised for this purpose (Glénard, Landau, Bardenheuer, Rosenheim, Teufel), but it must be remembered that a belt that suits one person will not suit another, and consequently that no stock pattern can be prescribed without careful trial. Many of the corset-belts now in fashion either exaggerate all the ill effects of the corset, or afford no support whatever to the prolapsed stomach. As a rule, the binder or belt should extend from the lower border of the twelfth rib to the symphysis, and should be made of some light but firm material, which will not easily stretch. Silk elastic makes an excellent belt, but it needs constant renewal. The support should be applied when lying upon the back, and should be laced or tightened from below upward. To prevent it from riding up, a perineal band may be worn, or, in the case of a woman, the suspenders may be attached to it on either side. For some time the belt must be worn both day and night, but when considerable improvement has taken place it may be left off when the patient goes to bed.

Duret, in 1894, was the first to treat gastroptosis by an operation, which consists of suturing the lesser curvature to the abdominal wall; while three years later Davis adopted the plan of fixing the lesser omentum to the parietes. Rovsing attempted to suture the anterior wall of the stomach, and Coffey the great omentum below the transverse colon, to the parietes; while Beyea and Bier introduced methods of plicating and shortening the gastrophrenic and gastrohepatic ligaments. More recently Eve has reported a case in which a successful result was attained by suturing the lesser curvature of the stomach to the liver. Although the various cases which have been subjected to operation are reported to have improved, the author believes that most cases of gastroptosis severe enough to warrant operation are of too complicated a nature to promise a cure from mere elevation of the stomach, and that the neurasthenia which invariably exists is a more important factor in the production of the symptoms than the mere dislocation of the stomach. When the gastric displacement is due to organic stenosis of the pylorus or duodenum, gastroenterostomy is usually sufficient without suturing the stomach to the liver or abdominal wall. Fixation of the right kidney has no effect whatever upon the coexisting dislocation of the stomach, and usually increases the gastric symptoms by the induction of nervous shock.

The food must be regulated according to the necessities of each case, and the existence or otherwise of complications.

Gastroptosis associated with healthy intestinal functions and good gastric compensation merely requires a full diet composed of substances that are easily digested. Moderately cooked and tender meats, fish,

game, eggs, sweetbread, tripe, sheep's head, calf's head and feet, well-boiled cereals, farinaceous puddings, and a moderate amount of fruit may be allowed; and the patient should be encouraged to drink milk with the meals, and to indulge in cream and other forms of fat. Raw vegetables, pastry, sauces, pickles, and cheese should be avoided. When emaciation is a marked feature of the case, and is attended by neurasthenia, a milk diet is often of great value, five pints mixed with a small portion of lime-water being administered in divided doses during the course of the day.

Gastroptosis accompanied by myasthenia requires a diet suited to this important complication. The great principles to be borne in mind are to supply the stomach with those forms of food which are most easy of digestion, to avoid overdistention of the organ, and to allow a sufficient interval to elapse between the meals, in order that the viscus may completely empty itself on each occasion.

Sugars and fats in excess are always injurious, owing to the tendency of the former to undergo fermentation and of the latter to stagnate in the stomach. Butter and cream may be allowed in moderation, as well as rice and well-cooked oatmeal porridge. Lean meats, white fish, fowl, game, and eggs may be given, but soups and broths should be avoided. Spinach and asparagus may be taken in small quantities, but raw and coarse vegetables are difficult of digestion. An exclusive milk diet rarely agrees, owing to the distention of the stomach which ensues from the introduction of large quantities of fluid, and at most eight ounces should be taken with each meal. Tea and coffee rarely agree, and cocoa proves injurious from the sugar it contains. A decoction of cocoa-husks or cocoa-ribs forms a palatable drink, and is free from the disadvantages which pertain to the other varieties. If the patient is accustomed to take alcohol, a little good brandy or whisky may be allowed; but, as a rule, half a tumblerful of hot water, sipped at the end of the meal, is more beneficial.

When colitis complicates the gastric displacement, the diet should consist entirely of finely minced fish and poultry, tripe, sweetbreads, and sheep's brains, dry toast, meat juices, clear soup without vegetables, potatoes, and plain milk puddings. Green vegetables and fruits are particularly harmful, and as a rule red meats should be avoided. Vichy or Contrexeville water may be taken with the meals.

In uncomplicated cases drugs are seldom of much value, and the treatment is chiefly symptomatic. If the appetite is bad, a dose of nitrohydrochloric or phosphoric acid, combined with a bitter infusion, may be given between the meals. Occasionally the sense of extreme weakness may require the exhibition of strychnine, nux vomica, cinchona, or some other tonic; while in many instances cod-liver oil, the compound syrup of the hypophosphites, elixir of phosphorus, or formate of sodium, produce a beneficial influence upon the symptoms of neurasthenia. Pain after food and flatulence usually depend upon some morbid condition of the gastric secretion, or an increased sensibility of the gastric mucous membrane, and in such cases the compound bismuth mixture, with or without morphine, will usually afford relief. Sometimes a preparation of pepsin or pancreatin appears to aid the processes of digestion. The development of myasthenia requires the addition of carbolic acid to the bismuth mixture, while, in cases complicated by colitis, full doses of salicylate of bismuth or guaiacol should be employed.

The selection of a suitable aperient is always a matter of importance. As a rule, severe purgatives must be avoided, and reliance be placed on small doses of cascara and euonymin, combined, if necessary, with belladonna and rhubarb. In other cases a confection of cascara and malt, taken at bedtime, proves efficient; or one composed of guaiacum, senna, and ginger may be employed with advantage. When colitis is accompanied by constipation, nothing is so effectual as a small dose of castor oil each morning before breakfast; but if severe neurasthenia exists, all purgatives may have to be omitted, and an action daily of the

bowels secured by an enema of soap and water or an injection of glycerin. Carlsbad salts and other salines are chiefly indicated when myasthenia with stagnation of food exists, as their employment effects a form of internal lavage, and the fermenting contents of the stomach are swept into the intestine. In other respects the medical treatment of gastroptosis is conducted upon the lines laid down for the management of chronic gastritis and atony of the stomach.

THE TREATMENT OF INFANTILE PARALYSIS.

Moxon writes in the *Practitioner* for November, 1906, on this topic. He says that as soon as the acute stage has passed off, and the pain and constitutional symptoms have subsided, there are four chief aims to be kept in view with regard to treatment, viz.:

1. To ascertain, so far as possible, the exact extent of the damage done.

2. To anticipate, and prevent, so far as possible, the advent of any definite deformities.

3. To maintain the nutrition and tone of the muscles of the limb, and especially the unaffected ones.

4. To train, or it may be to reëducate, the child in the use of the injured limb under its new conditions, in such a way as to gain the maximum amount of benefit from the action of unaffected or only partially paralyzed muscles, and also to train them, so far as is physiologically possible, to take the place of those muscles which are functionless.

Of these four aims, the last must be considered the most important, not only intrinsically, but also from the fact that, in its accomplishment, the third aim is also most effectively secured; since there is no external stimulus which can be applied to a muscle in order to maintain its tone and nutrition at all comparable with the stimulus which reaches it from the central nervous system by means of its own nerve.

The satisfactory determination of the exact amount of permanent damage which will result in any given attack of anterior poliomyelitis is by no means always an easy matter. The period of acute febrile disturbance is followed by an interval, to which succeeds a period of gradual improvement, which lasts for a variable length of time; and it may sometimes be six months before the exact extent of the final paralysis can be fully and precisely ascertained, but in the majority of cases a very fair estimate may be obtained, within a very much shorter period, by a careful investigation of the electrical reactions of the muscles of the affected limb.

Should an early commencing deformity be detected, a suitable light leather, or poroplastic, splint should be worn at night, in order to correct it so far as possible; and during the day, as soon as the child attempts, or is trained, to use the affected limb, careful watch must be kept to prevent it from using it in such a way as to increase the tendency to any particular deformity in course of development.

As soon as the acute symptoms have subsided, and all pain disappeared, massage and passive movements should be instituted, and of the two the latter is the more important, resistance movements being especially valuable. Massage once a day, and passive movement at least three times a day, should be carried out with the utmost regularity. With regard to the use of electricity in these cases, it is sometimes of great value, but the benefits which are said to result from its use have possibly been somewhat overestimated, and there is a risk of overstimulation of the unaffected muscles, which may tend to increase any developing deformity. In cases in which the muscles react to the faradic current, benefit often results from its use, and if overstimulation of the muscle is avoided no harm is likely to result.

In those cases in which the muscles react only to the constant current one great difficulty often arises. The majority of children strongly object to its use, and while they will often stand a faradic current strong enough to send the observer's muscles into tetanus, they will often not tolerate a galvanic current sufficiently strong to produce muscular contraction, in which case no

object is gained by its use. In short, each case must be judged on its merits with regard to the use of electricity. During this period the general health of the child must be attended to, and tonics, of which strychnine is perhaps the best, may with advantage be administered.

As soon as possible the training of the child in the use of the affected limb must be commenced, in the same way as, after the surgical treatment of the deformities which may result later, the patient has to be taught the proper use of his restored foot. It is in this latter means that the greatest hope probably lies of preventing or neutralizing the complicated deformities so often seen as an after-result of infantile paralysis.

SOME OF THE MANY USES AND THE METHOD OF ADMINISTERING NORMAL SALT SOLUTION.

In discussing this subject in the *Maryland Medical Journal* for November, 1906, MATTHEWS does not attempt to enumerate the conditions which loudly call for the normal salt solution, the most important ones being excessive hemorrhages, toxemia arising from various forms of infection, as in septicemia, uremia, the comatose state of diabetes mellitus, in cholera, and in threatened eclampsia. It is also very useful in severe burns to overcome shock and toxemia.

The best place in women to give an infusion is under the mammary gland, lifting the gland well up and inserting the needle beneath the lower outer quadrant, pointing upward, and allowing the solution to flow in slowly through a needle about two millimeters in diameter. The needle should be inserted while the solution is flowing so no air can be introduced.

The loose cellular tissue and the breast quickly begin to distend; even a flatly atrophied organ will reach the size of a puerperal breast. The amount that can be easily put under a breast is about 700 cubic centimeters. It is more satisfactory in the male and in emaciated individuals to lift the pectoral muscles, directing the needle upward and inward so that the fluid will infiltrate the subclavicular and axillary spaces.

The proper temperature of the fluid can be maintained by letting the tube carrying the saline solution lie immersed in a pan of hot water, about 115° Fahrenheit. The saline enemas, which are often preferable, are best given in the way adopted by Murphy and the Mayos—that is, by inserting a small rectal tube and allowing a small stream of hot saline solution to flow into the rectum continuously. A large amount of the solution is thus taken up in the course of a day. The flow can be regulated by the elevation of the vessel above the individual, or, better, by a clamp on the tubing, limiting the flow to a very small stream, not more than a pint an hour. In surgical cases under anesthesia it is well to give a pint by rectum before the patient awakens, for if given while awakening from the anesthetic the patient will nearly always expel it.

The author only recommends transfusion in very exceptional cases. It is a well-known clinical fact that some cases of shock are not much benefited by intravenous infusions of saline solution.

THE GENERAL PRINCIPLES OF TREATMENT IN INFECTIONS OF THE BILIARY TRACT.

A. O. J. KELLY in the *American Journal of the Medical Sciences* for November, 1906, writes upon this important subject. He asserts that the intelligent treatment of any patient presupposes a clear conception of (1) the pathology of the disease in question, of its pathological anatomy, and its natural tendencies; and (2) of the means of treatment at our command, and the objects attainable by their use. Of these none is more important than a knowledge of the natural history of the disease. To attempt by internal medication to dissolve a gall-stone that is insoluble; to cause the passage through the gall-ducts of a gall-stone when the ducts are impassable to a stone of its size; to attempt to cure supposed gastric symptoms by measures directed to the stomach, when the cause of the symptoms is adhesions, when, perchance, they have been diagnosticated, is as futile as it is irrational.

In view of the frequency of gall-stones in

infections of the biliary tract they may well be included in a consideration of the indications for treatment. The main indications may be said to be: (1) To cause solution of the stone or stones; (2) to cause the discharge of the stone or stones; and (3) to treat the complicating infection.

As regards the solubility of the gall-stones Naunyn states that we have to consider cholesterin, bilirubin-calcium, calcium carbonate, and calcium phosphate. Of these, bilirubin-calcium and the inorganic salts of calcium are insoluble in the bile; cholesterin, however, is quite soluble in the bile, and even in conditions of disease the bile scarcely if ever contains so much cholesterin that it cannot take more in solution. We have, therefore, to admit the possibility of cholesterin stones being dissolved. In fact, there is some experimental evidence that goes to prove that not only *in vitro*, but also *in vivo*, cholesterin stones may be dissolved. Naunyn quotes Labes's experiments of thirty years ago, in which he introduced gall-stones into the gall-bladder of dogs, and killing the animals two months later found that partial solution of the stones had occurred. Recently Bain has published the results of some studies that show the same possibility. In these experiments, however, the calculi were introduced into normal gall-bladders (or, as in one or two of Bain's experiments, into gall-bladders in which a cholecystitis has been artificially produced). The conditions are quite different in the human subject affected with gall-stones—in which we have to deal not only with the stone, as such, but also with the subacute or chronic lithogenic catarrh, the direct cause of the gall-stone formation. It is thus exceedingly doubtful whether spontaneous solution of gall-stones ever occurs in the human subject—indeed, whether it is at all possible. Naunyn states that in studying one thousand cases of cholelithiasis he has seen trustworthy evidence of the solution of the stone in perhaps ten cases (one per cent). Though he does not deny that the solvent action of the bile may be a contributing factor in the process, he inclines much more to the belief that the disintegration of the stone is due to the action of bacteria, and for the reasons that he has found this disintegration, not in cases of a single stone, but in cases of numerous stones; that the process involved many stones; that the solution was not circumferential, as it would be in the event of solution in a dissolving menstruum, but was circumscribed at the periphery and extended deep into the calculi; and that the disintegration went hand-in-hand with the deposition in the stones of inorganic calcium (phosphates and carbonates), certainly due to bacterial activity. The reasons for the non-occurrence of solution of the stones are, first, and most important, the fact that on account of the presence of the stones the activity of the walls of the gall-bladder is compromised, it cannot empty itself completely (a certain amount of residual bile is always present), and the desirable irrigation of the gall-bladder with fresh bile (the solvent menstruum) does not occur; and secondly, the fact that on account of the associated catarrh of the biliary tract the bile contains more cholesterin than is normal, and thus takes up an additional increased amount with less avidity.

Naunyn furthermore points out that even should it be possible to cause disintegration of the stones in the gall-bladder, it is exceedingly doubtful how much good would be thereby accomplished, since in this event the residual particles of the disintegrated calculi would remain in the gall-bladder and form the nucleus of new calculi. These are formed by the cementing together or incrustation of the disintegrated particles by newly precipitated bilirubin-calcium, the formation of which is favored by the persisting infectious inflammation of the mucous membrane, which gives rise to a secretion rich in calcium.

This reasoning is well borne out by clinical experience, since it is exceedingly doubtful whether, with any means at our command, we can cause solution of gall-stones in the gall-bladder. We now know that the thousands of gall-stones said to have been passed by the bowel after the administration of olive oil are merely masses resembling gall-stones in outward appear-

ances, and due to the basely deceptive powers of the olive oil acquired in its passage through the intestinal tract. We must conclude, then, that the solution of gall-stones is scarcely the object of rational treatment.

THE TREATMENT OF PUERPERAL ECLAMPSIA.

In the *Birmingham Medical Review* for October, 1906, SAVAGE gives a summary of the method of treating puerperal eclampsia as practiced at the present day. The practice of the Rotunda Hospital, Dublin, is described by De La Harpe. Veit's treatment by large doses of morphine is adopted, but induction of labor is never performed, and forceps are only applied in very exceptional cases and when the head is already on the vulva. The treatment consists in:

1. Morphine, half a grain hypodermic injection, followed by a quarter of a grain, and given, if necessary, every two hours up to two grains and until sleep is obtained.

2. A large amount of water is given to drink, or, if unable to drink, the stomach is washed out by three or four pints.

3. Two ounces of castor oil with three to four minims of croton oil.

4. The lower intestine is washed out by a rectal saline.

5. Diaphoresis is induced by covering with warm blankets.

6. Lying on side to prevent the saliva running down trachea.

7. Digitalis and atropine are given when necessary, on account of the weakening of the circulation and respiration.

8. Saline injections with phlebotomy in cases of plethora.

The statistics with this treatment show a mortality in the hospital of 16.9 per cent, whereas during the period before it was adopted, from 1889 to 1892, it was 35.3 per cent.

Robert Jardine, who advocates the treatment of puerperal eclampsia by saline diuretic infusions, says that by prompt purging with salts, the use of diuretics, and a milk diet, cases of marked dropsy and the albuminuria of pregnancy, when they have reached the stage of severe headache, and presumably, he says, within an ace of having fits, can be saved from having eclampsia by this treatment. He quotes six such cases with satisfactory results. On the other hand, he says, when the fits are occurring diuresis cannot be established quickly enough in the ordinary way, absorption by the stomach is almost in abeyance, and even if it were normal a good many hours would have to elapse before the action could be set up; hence the drugs must be given subcutaneously. For instance, in a comatose patient he pours four tablespoonfuls of salts into the stomach through a tube, gives an infusion of two pints, and applies a hot pack.

In the matter of the obstetric treatment, Jardine does not interfere if labor has not begun. During the first stage dilatation is left to nature if the fits cease, but if they recur he says the uterus should be emptied as quickly as possible. During the second stage delivery should be effected at once and under deep chloroform narcosis.

The mortality in the Glasgow Maternity Hospital, previous to fifteen years before (writing in 1901), by treatment with chloroform, chloral, bromide, veratrum viride, and morphine, was 47 per cent. Since the saline infusions have been added to the treatment the mortality has fallen to 17 per cent in over thirty cases.

A DISCUSSION OF OVER-NUTRITION AND UNDER-NUTRITION.

In a discussion of this subject contributed to the *British Medical Journal* of October 27, 1906, CHITTENDEN says he is of the opinion that the physiological evidence so far accumulated by dietetic experiment on man, reënforced by the more or less reliable evidence of thousands of individuals living at a lower level of proteid metabolism, indicates that the normal requirements of the body for proteid food do not demand more than one-half the amount called for by existing standards. In his judgment the daily consumption of proteid food, far beyond the amount required to maintain health, strength, mental and physical vigor, body weight, and nitrogen equilibrium, constitutes a form of over-nutrition as serious

in its menace to the health and welfare of the human race as many other evils more striking in character. He believes there are more people suffering to-day from over-eating, over-nutrition, than from the effects of alcoholic drink. Surely if people, as in his experiments, can maintain nitrogen equilibrium and body weight, gain in strength, show greater freedom from muscular fatigue, lose their rheumatic and gouty symptoms, regain a smooth and soft skin, exhibit greater freedom from colds, retain the normal hemoglobin content of their blood, and in every recognizable way manifest a good condition of health on a low proteid diet, why should we hesitate to accept the teaching which the scientific data point to?

DISEASES THAT SUGGEST SPECIAL DANGERS IN USE OF X-RAY.

To the *Journal of the American Medical Association* of November 3, 1906, EDSALL contributes a paper on this important theme. He points out that there are at present certain points in our knowledge that indicate that the most noteworthy dangers are to be expected in those diseases in which there would be particular difficulty in completely disintegrating and in excreting the products of the tissue breakdown that the *x*-ray causes; and two groups of disorders seem to deserve more careful consideration in this respect than any others with which we are as yet familiar.

One of these has become pretty well known. Clinical and pathological observation has shown that nephritis may follow *x*-ray exposures, and the enormous increase in excretion that sometimes follows exposure makes it evident that the kidneys are liable to suffer. From the occasional occurrence of nephritis, therefore, as well as from observations on metabolism, we must conclude that with those patients who already have nephritis or those whose kidneys are under especial strain *x*-ray exposures should be guardedly used or excluded.

The other group has been suggested to the author's mind by the fact that all the cases in which he has seen evidently serious results were already subjects of a considerable degree of toxemia. It would seem highly probable that a person already struggling with a toxemia would be more likely than a normal person to suffer ill effects to his organs of metabolism, as well as to his kidneys, if, in addition to his previous burdens, he were suddenly required to complete the disintegration and excretion of a large mass of broken-down tissue. It appears, therefore, that those who are to any noteworthy degree toxic from metabolic disorder or infectious disease should not be exposed without great caution and without urgent reasons.

It is probable that a third group with which we should proceed very cautiously is constituted by those cases that are very anemic. The tissue-destroying effect of the *x*-ray is so largely exerted on the blood-building organs that it might readily cause serious embarrassment if these organs are already insufficient, and the author has recorded two cases with pernicious anemia that became profoundly, indeed fatally, ill after one exposure. On the contrary, he observed two cases of the same disease that were benefited, one very greatly and rapidly benefited, by *x*-ray treatment, and it is possible that in some circumstances ordinary doses may destroy or at least seriously damage large portions of the blood-building organs, while in other circumstances the same dose may influence them favorably. It is possible, too, that toxemias may at times be favorably influenced, and it must likewise be admitted that the effect is not damaging in every case of nephritis, of marked toxemia, and of decided anemia, and particularly with those cases in which there is pronounced anemia in association with a distinctly toxic state. He believes that further clinical, metabolic, and other accurate studies of the contraindications, as well as of the indications, for the use of the *x*-ray constitute a valuable field of investigation, and it seems to be extremely desirable that clinicians make it a general custom to observe patients very carefully after *x*-ray exposures, in order to determine whether noteworthy after-symptoms seem to be common, even though the patients appear to be doing well under the exposures, and

particularly to make careful studies of the urine in a large number of cases. The result of such observation would not be to throw further discredit on the *x*-ray, but to make it possible to use it more rationally and with more logical judgment.

The author may not improbably be met with the objection from various sources that as yet there are but a limited number of dangers known to be associated with the use of the *x*-ray, and that the number of cases known to have been seriously damaged is small; but this objection may be met with sufficient force by the statement that the dangers of the *x*-ray have been recognized for only a comparatively short time, and that there has consequently been relatively little opportunity to determine how great and how numerous they are, and that in spite of this a very considerable number of cases that have been injured have been described. The histological studies and the studies of metabolism that have thus far been made make it wholly rational to expect that the dangers are more frequent than we yet know, and it appears to the author to be wise and proper not to belittle the dangers and attempt blindly to escape them, but to determine what they are and how they may be avoided.

ACCIDENTS DUE TO CHLOROFORM INHALATION.

A very interesting abstract of a recent paper on this important subject is to be found in the *Lancet* of November 3, 1906.

M. J. Tissot has undertaken an important research, which is recorded in the *Revue Scientifique* (5th series, tome v, Nos. 12 and 14), dealing with the causation of accidents occurring under chloroform. As he indicates, it is necessary before any clear understanding upon such a subject can be arrived at that we should obtain accurate knowledge about the mechanism whereby chloroform gains intimate access to the ultimate anatomical elements of the tissues of the body, and that we should be able to obtain trustworthy data upon the effects produced by definite quantities of chloroform in the arterial blood and in the tissues themselves. While investigating the conditions which control the passage of chloroform vapor contained in an atmosphere into the arterial circulation, Paul Bert came to the conclusion that percentages of chloroform vapor in air less than from 1.4 to 1.6 per cent were incapable of establishing anesthesia, while those above 2.4 per cent were liable to produce accidents and sometimes even death. Thus he obtained his well-known "workable zone" of atmosphere of chloroform vapor ranging in concentration from 1.6 per cent to 2.4 per cent. His determinations agreed with those arrived at independently by Snow, Dubois, and more recently in England by the Special Chloroform Committee of the British Medical Association. The absorption of chloroform from such an atmosphere into the arterial stream is determined, according to Bert, by the difference of tension between the two. Anesthesia would therefore be obtained when these tensions were equal and when chloroform was deported by the venous blood at the same rate as that at which it was conveyed to the arterial stream.

M. Tissot now points out that this theory can no longer be accepted, as Bert overlooked an important factor in the problem—the amount of the lung ventilation. M. Tissot asserts that while it is true that a 0.8 per cent will not induce anesthesia when the lung ventilation is feeble, yet when artificial respiration is practiced and the vigorous breathing thus produced leads to an increased actual intake of chloroform profound narcosis can be obtained. These experiments also demonstrate that even low percentages of chloroform vapor when given while full ventilation is insured produce not only profound narcosis but a fall of blood-pressure of from three to four cm. of Hg, and that the intoxication of the tissues is sufficient to determine a persistence of anesthesia lasting fifteen or more minutes subsequent to the cessation of inhalation. The experiments further show that when a percentage of 1.2 is used anesthesia is obtained only when artificial vigorous lung ventilation is practiced, and disappears after a time when normal breathing is resumed; 1.6 per cent barely suffices to render dogs insensi-

ble, but when vigorous artificial respiration is carried out by manual pressure upon the chest the animals are soon killed by this dilution of chloroform vapor. M. Tissot is thus led to enunciate one of his conclusions: the entrance of chloroform into the blood is determined solely by the tension of its vapor in the pulmonary alveoli, and not by the actual percentage value of chloroform in the atmosphere inhaled. The alveolar tension is lowered by the absorption of chloroform into the arterial stream after each inspiration, and is raised to a higher level when the pulmonary ventilation is increased. If this view is correct we may accept M. Tissot's practical commentary that it explains many of the deaths under chloroform which have occurred during the stage of excitement, when the breathing becomes both rapid and deep and thus brings about the fullest lung ventilation. It also explains the so-called "susceptibility" of dogs to chloroform, since these animals are very liable to rapid breathing during the induction period.

A further proof that Bert was mistaken in his view that at a certain period there occurs an equilibrium of tensions between the chloroform contained in the inhaled atmosphere and in the blood stream is afforded by M. Tissot, who by shaking blood in the presence of chloroform (1.6 per cent) found that 90 milligrammes of chloroform per 100 cubic centimeters of blood are taken up, the lethal dose of chloroform being from 60 to 70 milligrammes per 100 cubic centimeters of blood. It is reasonable to believe that Bert's theory that an equilibrium is established between the ingoing and the output of chloroform was based upon a fact which all workers have recognized, viz., that there is in all cases of ordinary surgical anesthesia a period of quasi- and unstable equilibrium. The breathing lessens in amplitude and the blood-pressure falls, so that the very conditions at which M. Tissot has arrived experimentally are brought about and the patient takes in less chloroform, while his tissues absorb less since the lung ventilation is diminished.

This state of quasi-equilibrium depends, M. Tissot believes, upon two factors—the rapidity with which the chloroform penetrates into the blood stream and the celerity with which it passes thence into the tissues. The diffusion of the chloroform from the blood and into the tissues is controlled by the duration of contact between the blood and the tissues; the relation subsisting between the quantities of chloroform in the blood and in the tissues; the rapidity of the circulation; and the actual nature of the tissue itself. The physical laws which govern the first two of these four factors have been investigated and are now recognized, but there has been less work undertaken to elucidate the last two, and M. Tissot has set himself the task of studying the problems which they present. In profound narcosis the circulation is considerably slowed, and as a result the blood in the pulmonary vessels absorbs a greater quantity of chloroform, while under these conditions the tissues take up more chloroform from the arterial blood. The actual amount of the anesthetic contained in the circulation and tissues thus becomes greater, and when the arterial pressure falls, as it does in deep narcosis, there is, if we accept M. Tissot's views, an increased danger of accumulation of chloroform when the blood-pressure is low. It has been long recognized that the nature of the tissues themselves plays a not inconsiderable part in determining the rate of absorption of chloroform by them, and that there is an affinity, if one may be allowed the term, between chloroform and certain constituents of the body. Pohl's reassertion that the lecithin-containing tissues possess this affinity in a marked degree has been confirmed so far as the nervous system goes by more recent observations and now receives the indorsement of M. Tissot.

Admitting the view advanced so strenuously by this writer that there is continuous and very definite accumulation of chloroform, that, in fact, it becomes "stored" in the tissues, we are bound to consider the effects upon the various tissues of the body of the passage of chloroform in and out of the organism. M. Tissot's view, and it is accepted in the main by other workers, is that during the period of induction the

chloroform tension increases in the arteries, then in the tissues, and in less degree in the veins. He asserts further, but here his work is not universally accepted, that the chloroform becomes "fixed" in the tissues and chiefly by those of the nervous system. Although the rate of absorption may vary from time to time owing to variations in blood-pressure, yet upon the whole this accumulation goes steadily forward and ultimately causes death when the chloroform tension reaches a certain and definite height. Bert's "safe zone" is brushed aside and definite proportions are safe only so long as we employ them in a diminishing scale when the narcosis is prolonged. We are told, rightly, that the effects of an anesthetic depend not upon the actual percentage of chloroform which is found in the arterial blood, but upon the amount which diffuses into the tissues, and especially into those constituting the nervous system. It is not an easy matter to determine the actual amount which must enter these tissues to determine anesthesia. Probably it is far less in amount than that which nine-tenths of patients inhale before becoming insensible, and the excess taken must depend to a great extent upon the method of inhalation adopted. When strong vapors induce rapid anesthesia M. Tissot tells us the tissues quickly become poisoned and remain on the verge of catastrophe until the inhalation is stopped and the veins withdraw from the tissues their excess of chloroform and deport it to the alveolar air, whence it is expired.

M. Tissot's results clearly demonstrate two sources of danger: the one arises either during excitement or reflexly, and consists in rapid and irregular breathing, which induces an unduly large quantity of chloroform vapor to be inhaled and fixed by the tissues in a unit of time; and the other the gradual accumulation of chloroform in the tissues which takes place during a prolonged inhalation of a non-lethal strength of chloroform vapors. The peril of an undue intake and of accumulation is accentuated, M. Tissot asserts, and his experiments appear to corroborate his view, when anesthesia is produced by large quantities of chloroform inhaled in a very brief space of time. The actual figures which he proposes are significant. In slow narcosis, such as from ten to twelve minutes, anesthesia is effected by from 32 to 38 milligrammes in 100 cubic centimeters of blood; in rapid narcosis the amount is from 50 to 70 milligrammes in 100 cubic centimeters of blood. In a medium case, from four to six minutes being taken for the induction, from 42 to 46 milligrammes are found. The dose of chloroform in the arterial blood does not necessarily as such determine fatal accidents, since, as has been pointed out, it is the amount of the anesthetic fixed in the tissues which is responsible for accidents, but indirectly the arterial blood being the vehicle by which the poison is conveyed to these tissues, it is important to know the relation between the dose which is competent to induce anesthesia and that which will destroy life. M. Tissot asserts that the lethal dose is double the anesthetic dose, and this statement is in harmony with the conclusions arrived at by Snow, Paul Bert, Dubois, Dastre, and many others.

Dealing with the mechanism of death from chloroform, M. Tissot's remarks are noteworthy, even though he has not attempted to review the work of other observers, if we accept his passing reference to that of Dastre and Morat, Richet, Knoll, and François Franck. The heart, M. Tissot believes, causes death. He regards primary heart failure as due to overdosage affecting the intracardiac nervous mechanism. The view that the heart muscle becomes directly affected does not find acceptance with him, although he advances no explanation of the acute dilatation which has been definitely described by others, and which appears to have been accepted by physiologists as proved. Nor does the reflex inhibition theory appear to impress this experimenter as having been conclusively demonstrated, although he favors the view that some subjects show an especial susceptibility toward chloroform, due, he suggests, to a peculiarity of their circulation or of the mucous membrane of their pul-

monary system. Secondary heart failure he regards also as always due to overdosage. In the one case it follows from excessive doses being administered when the breathing is abnormally full and abnormally deep; in the second it is due to accumulation of chloroform in the tissues; while in the third it is consecutive upon rapid and riotous respiration brought about by operative shock when the person operated upon is incompletely anesthetic.

We are not concerned at the moment with the practical advice concluding M. Tissot's paper, but his research calls for some comment. The salient points are involved in his attempt to prove that there is an accumulation of chloroform in the tissues. All thoughtful workers in this field of research have agreed long ago that the dangers of chloroform are the result of methods not infrequently employed. The risk of strong vapors rapidly inhaled is patent, and no one will be inclined to dissent from M. Tissot's dictum that all deaths from chloroform are due to overdose. We must of course carefully distinguish between deaths from and deaths under chloroform. Many deaths falling into the latter category have no causal relation with the anesthetic. But the possible danger of overdosage, even when dilute vapors are employed, has not been always studied or emphasized so well as by the writer of the papers which we are considering. It is matter of common observation, and inculcated, we believe, by the authorities, that the amount of chloroform required to induce anesthesia is many times larger than that necessary to maintain it. It has been shown also that so soon as unconsciousness is established the chloroform is conveyed away from the tissues. Again, for some minutes or even hours after an inhalation of chloroform has ceased the breath of the patient contains an appreciable amount of chloroform. These considerations all point to fixation of the drug by the tissues, and given their power to continue the absorption of chloroform it is not difficult to see how readily accumulation may lead to tissue poisoning and systemic disaster. If for no other reason M. Tissot's research deserves distinction in that it insists upon the importance of the rôle played by the tissues in the chloroform problem. We know at present comparatively little with exactness about the effects upon function caused by deterioration of tissues. It is permissible to assume that the resistive powers of tissues toward chloroform when lessened by disease or impoverished by physiological or pathological starvation will reveal themselves in various ways. The terms "caprice" and "idiosyncrasy" so glibly employed may express a very real pathological fact, and one with which the physician must reckon when he employs a drug like chloroform. In passing, we may indicate that this tissue depreciation probably causes the condition called "acidosis," or delayed chloroform poisoning (Guthrie), associated in some cases with chloroform inhalation. It is further noteworthy that the experiments of M. Tissot fall into line with much of the recent work upon chloroform dosage. If they prove anything, they demonstrate in the most convincing manner the danger of using strong vapors of chloroform and of compelling the patient by heroic doses to pass rapidly into insensibility. By strong vapors M. Tissot means those above 1.8 or 2 per cent. We think the necessity for slow anesthetization is at times overlooked. It should be slow, because the slowness, provided the inhalation is continuous, enhances the patients' safety and lessens their risk of after-complications.

SURGICAL RELATIONS OF THE PARATHYROID GLANDS.

MacCallum (*British Medical Journal*, Nov. 10, 1906) calls attention to the fact that the significance of the parathyroid glands, particularly in such conditions as tetany of digestive origin and in other autointoxications, is fairly well established. Ordinarily the loss of but one or even two of these glands is followed by no serious results, but a greater injury done to the glands or their entire removal occasions tetany. This is attributed to the form of intoxication ordinarily warded off by the parathyroid glands, whose function seems to

consist largely in the neutralization of poisons produced within the body and absorbed from without. The poison produced is certainly analogous to the tetanus poison, since it affects the central nervous system and so rapidly combines with the nerve cell as to be practically undemonstrable in the circulating blood. The parathyroid can neutralize this poison if it be injected in the form of the extract, though after complete thyroidectomy the sanitation of the animal can be maintained only with the greatest difficulty and by the injection intravenously of relatively large quantities of parathyroid material. This suggests that the treatment of postoperative tetany due to complete extirpation of the thyroid in the human is scarcely practicable excepting in mild cases, since the emulsion of extract of parathyroid must be introduced into the vein in considerable quantity, and the tetanic symptoms are extremely rapid and overwhelming in their development. In regard to the anatomy of the parathyroids, and this is of singular importance to the surgeon, Beebe writes most instructively.

There is, however, usually no great difficulty in recognizing them when they are seen, nor in distinguishing them from other bodies of the same size which may lie near, such as accessory thyroid lobules, bits of thymus tissue, lymph glands, or hemolymph glands. Some are as large as 1 centimeter in length by 4 or 5 millimeters in width, but many are very much smaller, and the average glands are perhaps 6 to 8 millimeters in length by 3 millimeters in width and 1 or 2 millimeters in thickness. They are flattened and usually elliptical or tongue-shaped, and quite soft. This soft, inelastic, flabby consistency aids greatly in distinguishing them from bits of thyroid tissue, which are much more firm and elastic, or from lymph glands, which are also much firmer. Their surface is always quite smooth and glistening, and except for the red lines of minute vessels, it is homogeneous in appearance, differing in that respect from the grayish-pink or red lymph glands, in the surface of which the opaque lymph cords can generally be made out as whitish-gray dots. In color they are of a clear, light brown, which may be rendered pale by anemia and the accumulation of fat, or converted into a brownish-red by congestion. It is particularly this bright-brown color, together with their flabby softness, which makes them easily recognizable.

Four may probably be regarded as the usual number, two occurring in apposition with each lobe of the thyroid; but the author's charts show many cases, as in Dr. Rogers's series, in which only three, two, or even one gland could be found. Doubtless there occur anomalous cases in which only two or three glands exist; but in many of these instances, if not in all, the remaining glands have increased correspondingly in bulk, and it seems probable that in most instances in which four glands cannot be found this result is due not to a real deficiency in the amount of parathyroid tissue, but to lack of energy and patience in the search for the rest of the glands.

Of 64 cases charted so far four definite glands were found in 36, three in 10, two in 15, and one in 3 cases. A number of these dissections were made by Dr. Whipple, but most of them by the writer, this attention to the parathyroids forming now a part of the routine autopsy technique. In practically all the cases the results of dissection were controlled by microscopical examination of the gland, although with some familiarity with the gross appearance this becomes entirely unnecessary.

The greatest diversity exists in different cases with regard to the position of these glands. So inconstant are they in their relation to any particular part of the thyroid or adjacent structures that any statement as to their usual position could not be anything less than actually misleading, unless couched in the most general terms. For example, we may say in general that the glands lie two on each side of the posterior or dorsal aspect of the thyroid gland, although, as has just been stated, it is often difficult or impossible to find both of them on each side, and on the other hand, one or more of them may not lie in this posterior region at all, but rather on the lateral aspect of the thyroid, or even upon the front of the trachea below the

thyroid. The recurrent laryngeal nerves which have been suggested by certain surgeons as a guide to their position do run in a general way in the region where they are most commonly situated, but the glands bear no definite relation to them, and frequently lie far away from the line of their course.

In most instances the lower of the two glands, which is usually the larger, lies near the posterior edge of the thyroid gland in the loose tissue which fills the notch in the branches of the inferior thyroid artery which enter the thyroid at that point. In most instances, too, the upper gland is found at the posterior edge of the thyroid, where it lies against the esophagus at the point where the superior thyroid artery fades away along the posterior edge of the thyroid. Usually, but not always, they are symmetrically placed on the two sides.

This may be regarded as the typical arrangement, of which others are variations, and in reviewing the charts it is seen that in 19 or 20 cases this is almost precisely their position. It is very common, however, to find the lower glands lying quite below the lower pole of the thyroid in the loose tissue, or upon the posterolateral surface of the trachea. Again, it is not uncommon to find the upper glands displaced from their position near the upper pole of the thyroid, and lying lower down among the branches of the inferior thyroid quite near the lower glands. Various irregular combinations of these relations occur, and sometimes one or other of the glands is found quite widely separated from the thyroid. On the other hand, it is rare to find them very intimately connected with the thyroid, and Beebe has not seen any embedded in its substance, although that is a common enough condition in the dog. The thyroid, as is well known, is closely enveloped in a dense but rather easily torn capsule, from which trabeculæ run into its substance. Outside this there is a quantity of very loose areolar connective tissue which often contains much fat, and it is in this tissue that the parathyroid glands usually lie. It is nearly always possible to lift them up from the thyroid, and to see that they are quite separate from its proper capsule, and in so doing there is brought to view the stalk of minute blood-vessels which spring, in the case of the upper gland (unless it is greatly displaced), from the superior thyroid, while those supplying the lower gland arise from a branch of the inferior thyroid artery.

From this it is seen that, provided the position of the parathyroids can be ascertained, it should be possible to remove the thyroid lobe without simultaneously removing them or even cutting off their blood-supply. It is obvious, however, that in order to do this one must avoid the ligature of the arteries at a distance from the thyroid, and indeed it is safer, if possible, to leave the posterior part of the thyroid with its intact blood-supply.

At best this preservation of the parathyroids offers difficulties, and in conditions in which the thyroid is greatly enlarged and surrounded by adhesions the difficulties may be very great; but the end is much to be desired.

With regard to another point in the surgical relations of the parathyroid glands the writer wishes to make some remarks here, since he has apparently been somewhat misunderstood in England in what he has already written. He refers to the relation of the parathyroid glands to exophthalmic goitre.

The possibility that this condition might depend upon an insufficiency of these glands was first suggested by Gley and acted upon by Moussu, who administered parathyroids to a patient suffering with the disease.

The author discussed the subject in a paper in 1903, without being able, from the material then at his command, to decide definitely for or against the idea. Two or three parathyroid glands removed with the thyroid and rather badly treated before being examined microscopically appeared to be atrophic, while others seemed normal in structure if rather small in size. Benjamins had found normal glands in his cases. Since that time nine cases have been examined, and the parathyroids found practically normal in all. They show in some instances a moderate atrophy of the cells and increase

in the interstitial connective tissue, but the alterations do not seem to be constant nor sufficiently extensive to support the idea that the parathyroids have anything to do with the development of the disease. The infiltration with fat, which has recently been described by certain English writers, is a well-known normal condition in these glands.

THE ROUTINE TREATMENT OF SYPHILIS WITH INTRAMUSCULAR INJECTIONS OF MERCURY SALICYLATE.

PALMER (*Boston Medical and Surgical Journal*, No. 17, vol. clv, 1906) holds that mercury salicylate possesses the advantage of causing no gastrointestinal irritation. Painful nodosities at times develop at the site of injection, though these are of minor import. The slow conversion of mercury salicylate into a soluble salt and its subsequent absorption allows the injection of a considerable quantity of the drug at one time, thus necessitating but one visit a week to the physician. One of the disadvantages attendant on the injection of salicylate, or indeed upon any insoluble form of mercury, is that incident to what is supposed to be pulmonary embolism. Half a minute after injection the patient experiences a dry cough, accompanied by a feeling of tightness in the chest, faintness, nausea, and air hunger. The cough usually persists for several days, during which time the sputum may be blood-tinged. Fatalities have been reported. Syncope is sometimes observed in nervous patients. Injections are usually driven into the gluteal region on account of the great mass of muscular tissue in that locality. Occasionally the interscapular region is employed, but then for only two or three injections. Each buttock should be divided into six or more injection sites. The injection should be administered alternately on either side. Liquid albolene is considered the best suspension medium, 1 part of the salicylate being employed to 10 parts of the fluid. Sterilization before use is not necessary, since abscesses do not develop when the suspension is freshly prepared and injected immediately without previous sterilization. None the less nodosities are likely to be frequent when the solution is kept for a long time and is not sterilized.

Any form of syringe may be used, but the piston should be provided with a check screw so that the dose may be accurately graded. The needle should be about 1¼ to 1½ inches long and of 21 gauge size. The patient is placed face downward upon a suitable table and the site for injection is selected. The horizontal position is to be preferred as the gluteal muscles are more relaxed in this position. The portion of the buttock selected is thoroughly rubbed with a mixture of equal parts of alcohol and ether, and the piece of gauze used for this purpose is left in place while the physician thoroughly shakes the bottle containing the injection fluid in order to make the suspension as complete as possible. Somewhat more than the amount to be injected is drawn into the syringe, and the needle is then attached. The syringe is inverted, and any air bubbles are expelled together with sufficient suspension fluid to make the amount in the syringe the exact quantity desired for administration. The gauze wipe is then removed and the needle is plunged quickly into the gluteal muscles for 1 to 1½ inches, depending upon the musculature of the individual. This must be done with extreme rapidity and by a sudden stab, since thus no pain will be inflicted. The syringe is at once detached from the needle; its lumen is watched for half a minute to make sure that a vein has not been punctured. Should bleeding be free the needle is reinserted; if not, the syringe and the needle are connected and the suspended salicylate is slowly injected into the tissues, whereupon the needle is removed and the place massaged for fifteen minutes. Primary injections consist of ½ grain of the salicylate or 5 minims of the 1-to-10 suspension. The first injection is generally followed in two days by a second injection of ¾ grain. In four days 1¼ grains is administered.

It is stated that in order to treat syphilis properly the patient must be kept on an amount of mercury a fraction of a grain less than the quantity known to produce symp-

toms of mercurialism, and it is always better to produce a slight gingivitis or other symptom of mercurialism, and in this way to find out how much mercury is necessary to keep the patient under control, instead of giving smaller doses without a knowledge of the patient's tolerance. In three-fourths of all patients 1¼ grains every seven days will suffice to keep the patient under control. At times this dose will have to be materially increased.

PSEUDARTHROSIS AFTER FRACTURES OF THE FOREARM.

Although failure of union is very rare after typical fracture of the radius, it is common in all other fractures of the radius or ulna, and this is due, according to FRAENKEL (*Münchener medicinische Wochenschrift,* No. 43, 1906), to the ease of rotation in these bones.

He proposes to correct the tendency to rotation, in cases treated by operation, by cutting the upper ends of the bones into a wedge, which fits in a corresponding notch cut in the lower. This groove and notch is made transversely in the radius and anteposteriorly in the ulna, thus preventing motion in either direction. In one case of severe injury to the lower forearm with loss of power of pronation, and ununited fracture, the above method was used on the radius, but a simple transverse resection on the ulna. The radius healed, but the fracture of the ulna left a false joint, which not only did not weaken the wrist, but gave it again the power of pronation which had been lost. The author suggests that perhaps cases with loss of rotation might be cured by the resection of the lower end of the ulna and the formation of a false joint there.

TUBERCULOSIS OF THE PROSTATE AND BLADDER.

Spontaneous cure is very rare in this condition, and, according to GUISY (*Annales des Maladies des Organes Génito-urinaires,* No. 18, 1906), operation should be performed whenever possible.

The condition is usually complicated by tubercular lesions either in remote organs or in the urinary system, which make operation futile. Of 269 cases of surgical tuberculosis, 183 were genito-urinary, and 86 of these were in that system alone. In 41 the urinary system was affected, in 29 the genital, while 15 were limited to the prostate and seminal vesicles. The general health may be good, unless the testicles are badly diseased, in which case premature senility appears.

As regards treatment, the only effective measure is extirpation, injections of various substances having proved useless. If only the prostate and seminal vesicles are affected the best route is the perineal. The vesicles should be removed even if apparently healthy, as removal tends to check the spread of the disease. Even though the vesicles alone are diseased it is safer to remove the prostate too. The latter is excised through the perineum. If the bladder is affected it should be opened above and its lesions should be excised or cauterized. If one kidney is tubercular, it should first be removed and the lower lesions not touched until after healing of the wound. If both the bladder and a kidney are diseased, it is best not to operate. The operation should be performed as soon as the diagnosis is made, as other treatment is ineffective even in the earlier stages.

LUPUS—TREATMENT WITH X-RAYS AND RESORCIN.

Better results than can be obtained by either of these agents alone are claimed by REINES (*Berliner klinische Wochenschrift,* No. 35, 1906), who believes that an application of resorcin prepares the tissues for the action of the rays.

Resorcin, as a 33-per-cent ointment, is spread on linen and applied to the affected part by means of a bandage. In twelve hours it is removed, and it is seen that the upper layers of the lupus patch are grayish-white and so soft that they can be rubbed off with a piece of gauze wet in sublimate solution. The paste is then reapplied and the process continued for five to six days. Boric salve is then applied for a few days, and the process repeated until the patch is healed. If a space larger than the palm of

the hand is never treated at once, and no salve stronger than 33 per cent used, there is no danger of poisoning. The outer layers being thus removed the *x*-rays have a better chance to act. The removal of the tissue after use of resorcin should be as great as can be done without pain. When a weeping surface free from epithelium is exposed, the rays are begun with medium hard tubes and 30-centimeter spark-gap. The exposure lasts ten minutes. The resorcin treatment is continued at the same time.

SPINAL ANESTHESIA—3000 CASES WITH TROPACOCAINE.

No bad effects were seen in the entire series of cases reported by SCHWARZ (*Presse Médicale*, No. 64, 1906), who has himself used the substance 1000 times.

The headache and nausea were no more marked than after simple spinal puncture, and no dangerous effects were seen. The technique differs from that usually employed, in that the tropacocaine in powder was placed in a sterile glass, and the spinal fluid being drawn into the glass dissolves the substance, no water being added. For operations on the legs and perineum, ¾ grain suffices, but for the abdomen 1 grain is required. It should not be used in children less than fourteen years old, although old age is not a contraindication. As it lowers blood-pressure it may be dangerous in persons whose pressure is already low. Increased extent of anesthesia must be obtained by raising the pelvis and not by increasing the dose.

DIFFICULT LABOR FOLLOWING VENTROFIXATION.

In the case reported by HOCHEISEN (*Berliner klinische Wochenschrift*, No. 35, 1906) labor was made impossible by the distance of the os uteri from the vulva.

Examination showed that the os uteri was placed far up and behind, and it was not possible to reach it with the finger or to bring it in view in a speculum. It was absolutely hopeless to expect natural delivery, and the choice lay between Cæsarian section, opening the abdomen and trying to replace the womb after severing adhesions, which has yielded no good results, and section of the anterior uterine wall and extraction of the child through the pelvis. The last way was decided upon, in spite of the danger of wounding the bladder, as infection was feared, the amniotic fluid having escaped thirty-six hours earlier. The only difficulty in the operation was in finding a knife long enough to reach beyond the bladder. Bleeding was slight, and the hand was easily inserted into the womb. As the wound could not be reached it was not sutured, but merely packed with gauze, which was removed the next day. The puerperium was normal.

HEAD OPERATIONS: CONTROL OF BLEEDING.

The loss of time caused by the bleeding of the scalp vessels is prevented by KREDEL (*Centralblatt für Chirurgie*, No. 43, 1906) by the use of metal strips. He uses flat strips, about one-fourth inch wide, curved to fit the head, and grooved on the convex side. The strips vary from two to three inches long and are used as follows: A long flat needle is passed through the scalp, down to the bone, at a point an inch from the intended incision, and passed along the skull parallel to this for a few inches and brought out through the skin again. A strip slightly longer than the course of the needle is laid on the scalp, and the strong thread which the needle carried is tied over it, compressing the scalp with its vessels between the thread and the strip. This is repeated until the entire intended incision is surrounded. In this way hemorrhage from the scalp may be entirely avoided.

SUPRAPUBIC CYSTOTOMY IN CHILDREN.

The chief interest in the case reported by MENDES (*Annales des Maladies des Organes Génito-urinaires*, No. 18, 1906) is the extreme youth of the patient, five months.

The author holds that lithotrity is not possible in such small children, at any rate if males, and perineal section is more dan-

gerous than suprapubic, so if there is a stone which demands removal, in a young boy, the only procedure is the suprapubic operation. In childhood the bladder rises higher than in later life, so that the operation is easier. The wound was sutured without drainage and recovery was uneventful.

TUBERCULOSIS OF THE TESTICLE—RESULTS OF CASTRATION.

The report of BECK (*Deutsche Zeitschrift für Chirurgie,* lxxxiv, 1) is based on 62 cases, of which 13 were bilateral. In 34 of these other parts of the genital system were affected, in 12 the urinary organs, and in 12 there were no other lesions noted.

Of the unilateral operations, 33 have been traced, and of these 15 are cured, 8 have died of tuberculosis, and 9 have had recurrence in the other testicle. After three years there is no more danger of recurrence. Of the bilateral cases 9 can be traced, and of these 2 are cured and 6 have died. The association of tuberculosis of the epididymis and of the prostate is not nearly so serious as that with tuberculosis of the urinary tract. In more than half the cases disease of the prostate recovers of itself after castration. Of the 12 cases with disease of the urinary organs (bladder), only one was cured. The fact that tuberculosis of the prostate heals after removal of the testicles, and the greater frequency of uncomplicated disease of the epididymis, show that the process begins in the testicle and extends along the canals in the direction of their normal flow.

CONTRACTED PELVIS—BEST CONDUCT TO FOLLOW.

The conduct of labor in women with contracted pelves was discussed by the last Congress of Scientists at Stuttgart (*Centralblatt für Gynäkologie,* No. 44, 1906), and most of those present favored the induction of premature labor.

This method gives very good chances for the life of the child—in fact, recent figures show a larger mortality among the children delivered by Cæsarian section. Pubiotomy is not spoken of quite so highly, but on the whole is to be preferred to section whenever it is possible. Version is only to be performed when the soft parts are relaxed. Premature labor may be performed in flat pelves of not less than 7 centimeters conjugate, and in generally contracted pelves of not less than 8 centimeters. Some of those present attacked this method on the ground that the indications were not clear, but on the whole the congress favored premature labor as the operation of choice, with pubiotomy as the second, but only under circumstances permitting a perfectly proper and aseptic technique.

FACIAL PALSY—OPERATIVE TREATMENT.

The anastomosis of the facial nerve with the root of the hypoglossus or of the accessory is considered by BERNHARD (*Mittheilung aus der Grenzgebiete,* xvi, 3). He finds that the benefit from the operation is most marked in its removal of those conditions due to the loss of muscle tone, such as drooping of the corner of the mouth and dribbling of saliva. The complex motions of expression are not much restored, smiling, etc., still causing marked distortion of the face. The hypoglossus is the best nerve to select.

TREATMENT OF ANTHRAX.

LENGFELLNER (*Münchener medicinische Wochenschrift,* No. 43, 1906) notes that the conservative treatment of anthrax is gaining ground daily. By conservative treatment he means leaving the pustules absolutely undisturbed, the protection of the surrounding surface by an unirritating salve which also prevents friction upon the parts of the bandage, and splinting and suspension of the involved extremity. This enables the tissues themselves to resist the spread of infection. The author contributes a tabulation of fifteen cases in which the diagnosis was confirmed by microscopic and bacteriological examination. All of these cases recovered. He notes that in one-third of the cases the arm was involved, in one-fifth the neck, in one-fifth the hand, and in one-third the face.

REVIEWS.

PREVALENT DISEASES OF THE EYE. By Samuel Theobald, M.D. W. B. Saunders Company, Philadelphia and London, 1906. Price $4.50 net.

Recent years have seen a great increase in the number of works on special branches of medicine designed particularly for the medical student and the general practitioner, the latest addition to the list of volumes on diseases of the eye being the book before us. The author condemns most of the treatises which have been written for this class of the profession, believing that they are "adapted not to their needs, but to the requirements of the specialist in this department of medicine." While it is possibly true that many of the books designed for the physician in general work fail in many important particulars, it is doubtful if the author of the present book has succeeded in presenting a volume that will meet the requirements any better than or so well as the works which he condemns. In the preface the author states that "he has not thought it desirable to encourage the general practitioner to rely upon the ophthalmoscope as a means of diagnosis," and therefore "has not even given a description of it or explained its use." In view of this statement it is rather surprising to find considerable space devoted to the diagnosis and treatment of diseases of the retina, choroid, and optic nerve, conditions that are only recognized and differentiated by the ophthalmoscope. And yet a treatise on eye diseases should include affections of this nature. Books on special branches of medicine serve most frequently as reference works, and under such circumstances the complete and concisely written work which serves as a guide in the simpler affections is none the less valuable because it describes diseases which the physician may not be willing or competent to treat, but of which a knowledge is of interest and value.

The author's descriptions of the various ocular conditions are clearly presented, and the essential points of difference of affections with somewhat similar symptoms and appearances fully emphasized. The illustrations accompanying the text have been well chosen, while the full-page colored drawings of external inflammations are unusually good, and should be of considerable service in differentiating the various types of ocular disease. In the forms of treatment advised the author gives those measures which he has found of service, although in a number of instances his views are somewhat at variance with the experience of others. This is especially noticeable in the matter of operations. In enucleation he adheres to the old-fashioned operation, condemning the bringing together of the conjunctival wound and the stitching of the severed muscles as "finicky" procedures, although operators of experience consider that these measures insure a more movable stump for the artificial shell. Tenotomy is given the preference over advancement of the ocular muscles in the operative treatment of squint, and even in divergent squint the cutting of both external recti muscles is advised, although in the latter condition the primary fault is most frequently weakness of convergence and not excessive diverging power. The transplantation operation in the treatment of pterygium is not mentioned, notwithstanding that most operators believe it to be superior to excision in large, fleshy growths, as it is not so likely to be followed by recurrence.

W. M. S.

THE PRACTITIONERS' MEDICAL DICTIONARY. By George M. Gould, A.M., M.D. Copiously Illustrated. P. Blakiston's Son & Co., Philadelphia, 1907. Price $5.00.

Dr. Gould's contributions to medical literature are exceedingly numerous and vary widely in their scope and character. We are glad that the best that he has done has been most appreciated by the profession, for the publishers tell us that before the issuance of the present work over 200,000 copies of Dr. Gould's other medical dictionaries had been sold. At the present time,

as we understand it, there exist four dictionaries by Dr. Gould: one the large illustrated Dictionary of Medicine, Biology, and Allied Sciences, the cost of which is $10; a Dictionary of New Medical Terms, the cost of which is $5; the Students' Medical Dictionary, the cost of which is $2.50; the Pocket Pronouncing Medical Lexicon, the cost of which is $1; and lastly, this Practitioners' Medical Dictionary, which is intermediate in price between the ten-dollar illustrated dictionary and the students' dictionary at $2.50.

The present volume appears in a flexible binding and covers 1043 pages. In other words, it is the large dictionary boiled down to a smaller compass; the paper is thin, the type closely set, and the volume is therefore very much smaller than many other books which contain precisely the same amount of information. Personally we would prefer using the larger dictionary and recommending the much smaller one for students, but the author and the publisher evidently believe that a dictionary occupying a middle position both in size and price is in demand. The present dictionary includes all the words and phrases generally used in medicine, with their proper pronunciation, derivation, and definition. Many of the tables which are in the larger dictionary are of course left out of this one, and but few illustrations are included, and these are not particularly apt. Most of the profession are familiar with Dr. Gould's dictionary in one form or another, and this familiarity forces them to recognize that any lexicon compiled by him must be well worthy of purchase.

DISEASES OF THE EYE. A Handbook of Ophthalmic Practice. By G. E. de Schweinitz, M.D. Fifth Edition, Thoroughly Revised. Illustrated. W. B. Saunders & Co., Philadelphia, 1906. Price $5.00.

Dr. de Schweinitz's work upon ophthalmology, designed at once as a text-book for the student, a reference book for the ophthalmic surgeon, and a manual for the general practitioner, has, in a comparatively short period, achieved the distinction of reaching its fifth edition, and has been warmly commended by reviewers not only in this country but in England, being classed as one of the best text-books upon this subject in existence here or abroad. In the present edition much new matter has been incorporated and all the text carefully gone over. The portions of the book which deal with the pupil and its anomalies, the varieties of conjunctivitis and their treatment, tumors and cysts of the conjunctiva and unusual forms of keratitis, and in addition those dealing with injuries of the sclera and the detection of foreign bodies in the eyeball, have all been rewritten, as have also the chapters upon the pathogenesis and pathology of sympathetic ophthalmitis and the pathogenesis of glaucoma. A number of new illustrations have also been added, and much care has been taken to explain in sufficient detail and yet concisely the various remedial measures which the author thinks advisable in ophthalmic practice. The book bears the marks of three valuable points which are essential to the successful author: First, large practical experience; secondly, an intimate acquaintance with the literature of his subject in this and foreign languages; and thirdly, and by no means least important, the results of his own personal investigations from an original standpoint, both clinical and experimental. By long odds the leading American text-book on this subject in the recent past it will surely maintain its position in the future.

A TEXT-BOOK OF THE PRACTICE OF MEDICINE. For Students and Practitioners. By Hobart Amory Hare, M.D., B.Sc. Second Edition, Revised and Enlarged. Illustrated. Lea Bros. & Co., Philadelphia and New York, 1906. Price $5.00.

The following preface from the second edition is self-explanatory:

"In presenting the second edition of his text-book on the Practice of Medicine the author desires to express his appreciation of the cordial reception of the work since it first appeared, a reception which necessitated its being repeatedly put to press.

"The present volume, prepared for the physician and student of medicine, embodies the experience of more than twenty-two years of active hospital and private practice, during which time the author has been constantly teaching the subjects of clinical medicine and therapeutics. With this experience

he has attempted to present the facts which the practitioner needs and which the student must thoroughly grasp if he is to be successful in gaining his degree and in practicing his art.

"In the preparation of many portions of the work careful collections of statistics have been made, and these have not infrequently given results which add materially to our conception of the frequency of certain diseases at different periods of life, of the relative frequency of different symptoms, and the value of certain plans of treatment.

"Particular pains have been taken to present methods of treatment clearly and in such a way that they may be put in practice.

"Much information that might be included, which deals with subjects which are still uncertain and debatable, has been excluded.

"Warm thanks are due Dr. W. M. L. Coplin, Professor of Pathology in the Jefferson Medical College, for valuable suggestions and criticisms, in which he has shown not only a complete grasp of his own department of medical study, but intimate knowledge concerning the latest developments in clinical medicine.

"The author also desires to acknowledge the valuable suggestions, made during the preparation of this edition, of Dr. Aller G. Ellis, Demonstrator of Pathology, and Dr. Alfred Gordon, Instructor in Neurology, in the Jefferson Medical College.

"The fact that the United States has, within the last few years, become possessed of territory in the tropics has greatly increased our interest in the many tropical diseases heretofore scarcely known by practitioners in the temperate zone, and the investigations by surgeons in the Army, Navy, and the Public Health and Marine Hospital Service have thrown much light upon these affections. Further than this, the investigations by English physicians have broadened our views very greatly as to tropical disease. As troops returning from tropical service often bring with them manifestations of these diseases, it behooves every practitioner to be able to recognize and treat such conditions. It seems appropriate, therefore, that a modern work on medicine should contain chapters on tropical medicine, the more so as lectures upon this subject are now given in many of the great medical schools.

"In the preparation of this second edition great care has been taken to embody the latest views that have received general acceptance as being scientifically and clinically correct, it being constantly borne in mind that the needs of the student and practitioner will be best met by excluding statements open to criticism and presenting facts which will prove useful in practice."

PRACTICAL DIETETICS WITH REFERENCE TO DIET AND DISEASE. By Alida Frances Pattee. A. F. Pattee, New York, 1906. Price $1.10 by mail.

When the first edition of this book appeared we reviewed it in terms of praise, and the present edition possesses all the advantages of its predecessor. The book is crammed with a large number of excellent dietetic suggestions and recipes for the preparation of various foods and drinks that are suitable for the sick. It is marred by containing a large number of pages in the back portion devoted to advertising purposes. In other words, this portion of the book closely resembles one of the ordinary journals of the day. However, as many of these advertisements deal with things which are useful to the physician who is especially interested in the dietetics and the feeding of infants, they are not really objectionable.

THE HARVEY LECTURES. Delivered under the Auspices of the Harvey Society of New York, 1905 and 1906. The J. B. Lippincott Co., Philadelphia and London, 1906.

This small octavo volume of a little over three hundred pages contains the Lectures which were delivered before the Harvey Society of New York, which society was organized by a number of New York physicians. The lecturers include men who are well known in the profession as being original investigators in this country and Europe, and number thirteen. The first one deals with the theory of Narcosis, by Professor Hans Meyer, of Vienna; this is followed by one upon Modern Problems of Metabolism, by von Noorden; and another

upon Trypanosomiasis, by Dr. Novy. Others follow by Dr. Park, of New York, upon Serum Therapy, and by Dr. Mendle, of Yale, upon the Formation of Uric Acid. Another follows upon Some Phases of Tuberculosis, by Professor Theobald Smith, and lastly is that of Dr. Howells upon the Cause of the Heart Beat.

A Pocket Formulary. By E. Quin Thornton, M.D. Eighth Edition, Revised. Lea Bros. & Co., 1907.

As Dr. Thornton is a graduate in pharmacy, an active practitioner of medicine, and Assistant Professor of Materia Medica in the Jefferson Medical College, he is possessed of a training which well qualifies him for the compilation of a series of prescriptions which will prove useful to the general practitioner. In this formulary the diseases are arranged alphabetically, and under each disease is placed a number of prescriptions which Dr. Thornton thinks are useful in the particular condition under consideration. The book is about the size of the ordinary visiting list, and can be readily carried in the pocket.

Medical Diagnosis. A Manual for Students and Practitioners. By Charles Lyman Greene, M.D. P. Blakiston's Son & Company, Philadelphia, 1907. Price $3.50.

This comparatively small book on Diagnosis, which closely resembles in its form the well-known manual of "The Practice of Medicine" by Hughes, which was published by the same firm, has been prepared by Dr. Greene, of St. Paul, Minnesota, in order to provide students and practitioners with a brief and "thoroughly modern" handbook of convenient size for studying diagnosis. It is all that it claims to be, is carefully prepared, accurate, and the text shows that the author has carefully consulted contemporaneous literature in its preparation. To those desiring one of the smaller books upon this subject it can be cordially recommended.

Abdominal Operation. By B. G. A. Moynihan, M.S. (London), F.R.C.S., Leeds. Second Edition, Thoroughly Revised. W. B. Saunders Co., Philadelphia and London, 1906.

This book, printed on exceptionally fine paper, in large, clear type, and admirably illustrated, is the clearest, most rational, most readily understood work that has yet appeared on abdominal surgery. Both in the preface and in the text Moynihan freely acknowledges the debt which he, and indeed all surgeons, owe to the work of W. J. Mayo, J. B. Murphy, and Mayo Robson.

The book is one which must be studied by every practicing surgeon, and to which it is impossible to accord too high praise. A detailed review would simply indicate an acceptance, an adoption, and a clear exposition upon the part of the author of all that is best in modern surgery.

Surgery: Its Principles and Practice. By Various Authors. Edited by W. W. Keen, M.D., LL.D. Volume I, Illustrated. W. B. Saunders Co., Philadelphia and London, 1906.

The first of the five volumes of surgery opens with a historical sketch by Mumford. In this the lives and work of Hippocrates, Galen, Vesalius, Pare, Albrecht von Haller, John Hunter, Joseph Lister, and about thirty American surgeons are briefly considered. This section of the book may be considered as a series of truly admirable biographies rather than as a systematic sketch of surgical progress.

Surgical physiology has been allotted to Crile, who because of the laboratory and clinical work he has done in this line is best fitted to make the practical application of its principles.

John C. Da Costa, Jr., contributes a chapter upon examination of the blood. He is evidently skeptical as to the absolute value of cryoscopy in determining the question of nephrectomy, following in this respect the teaching of Rovsing rather than that of Kümmel. The cellular elements of the blood are pictured and accurately described. The chapter closes with an extremely valuable discussion on special surgical hematology.

Hektoen writes on infection and immunity, discussing this question from the theoretical and laboratory standpoint, and clarifying, so far as this is possible, a study in which the ordinary reader shortly becomes lost in a maze of recently coined words.

Adami takes up the subject of inflammation from the standpoint of the pathologist.

His chapter closes with a section on the treatment of acute inflammation.

Freeman writes on suppuration, abscess, and fistula, but does not include in his work the results of the comparatively recent researches upon the staphylococcus albus. In the remarks upon treatment of abscess he very properly cautions against the unnecessary squeezing and scraping of the abscess walls after incision. He states that he has seen pyemia result from such practice. As to Bier's passive hyperemia, Freeman holds that its strongest indication is to be found in cases of chronic inflammation and suppuration, particularly when they are tuberculous in nature.

The treatment advised for carbuncle is ablation of the entire lesion by an incision carried through sound tissues, followed immediately by skin-grafting.

The section devoted to abscess, ulceration, and ulcers is a brief but most satisfactory discussion of the symptomatology and treatment of these affections. In his section on senile gangrene, Freeman advises immediate amputation when the gangrenous process extends to the sole of the foot, and rather favors section at the lower part of the thigh, since here the tissues are amply nourished by branches from the deep femoral.

The process of repair is considered by Francis Carter Wood. He notes that after injury the regeneration of the nervous tissues of the brain or spinal cord does not take place to any considerable extent. He states that partial functional restoration has been noticed in a few cases of complete transverse lesion of the cord after prompt union of the separated ends by suture, and attributes this to fibrillar regeneration, which he describes as taking place in the anterior and posterior portions of the cord and originating from the gray substance of the anterior horns. He considers wounds of the serous surfaces under a general heading, but does not explain the difference in resistance to infection or reparative power exhibited, for instance, by the pleura and the peritoneum.

The chapter on thrombosis and embolism, by Charles H. Frazier, considers exhaustively the pathology of these affections. Thereafter there is discussed the symptomatology as affecting individual vessels. Postoperative thrombosis, particularly in its relation to appendicitis, is dealt with at length. Attention is called to the comparative frequency of pulmonary embolism after injuries and operations. The section devoted to air embolism is a monograph in itself. Frazier deals very practically with erysipelas and tetanus, and contributes a brief, but from the surgeon's standpoint admirable, chapter upon scurvy.

Eugene Alfred Smith discusses traumatic fevers. He classifies them as aseptic and septic; the latter are further subdivided into septicemic and pyemic. Such terms as autoinfection and sapremia he rejects as absurd in the first instance, and confusing in the second.

Edward Hall Nichols writes upon rickets, illustrating his text by some admirable illustrations.

John Chalmers Da Costa contributes the section on surgical tuberculosis, beginning his article with a historical sketch and continuing with the conditions that predispose to infection, tuberculous abscesses, diagnosis of tuberculosis, tuberculosis of the skin and of other tissues and organs.

Chancroid and syphilis are briefly considered by Edward Martin.

Bland-Sutton contributes an excellent section upon tumors.

The first volume ends with a chapter upon wounds and contusions by Crile, including a section upon shock and collapse.

This brief résumé of the subject-matter of the first volume of Surgery, contributed by men particularly fitted for the work and molded into a symmetrical whole by an editor as skilful as is Keen, indicates a completed work which will rank with the best.

A Treatise on Surgery. By George Ryerson Fowler, M.D. Illustrated. W. B. Saunders Co., Philadelphia and London, 1907.

This work of Fowler's accentuates the sense of loss experienced by American surgeons in the death of the distinguished author, since there will be found embodied

in these two volumes all that is best of surgery. They possess the merit, lacking in systems, of having been written by one man, hence there is an even balancing which is especially desirable from the standpoint of the student, and is refreshing even to the busy surgeon.

The first part of the book is devoted to setting forth the fundamental principles underlying surgery. These include inflammation in its constitutional and local manifestations and surgical bacteriology. Thereafter there follow chapters upon injuries and diseases of separate tissues, under which come the skin and subcutaneous connective tissue, blood-vessels, lymphatic vessels and lymphatic glands, fasciæ, muscles, and tendons, bones and joints.

The third section is devoted to gunshot injuries. Thereafter are considered acute wound diseases, chronic surgical infections, including syphilis, tuberculosis, actinomycosis, etc.

The seventh section is devoted to laboratory aids in surgical diagnosis and prognosis, and aids to surgical diagnosis in general; thereafter surgical operations in general, surgical anesthesia, general principles of operative technique, operations on individual structures, foreign bodies, and bandaging.

Regional sugery is next taken up, beginning with surgery of the head. A special section is devoted to surgery of the female pelvic organs.

There is an index of names, together with a very complete general index, with proper cross-references.

The work shows a wide knowledge of current literature, a wise choice of what is best and likely to be permanent in modern work, unusual facility for clear expression, and a teacher's knowledge of classification and condensation.

THE TECHNIC OF OPERATIONS UPON THE INTESTINE AND STOMACH. By Alfred H. Gould, M.D. Illustrated. W. B. Saunders Co., Philadelphia and London, 1906.

The firm of W. B. Saunders Company has produced a book not only admirable from the publishers' standpoint and because of the singular richness and adequacy of illustration, but thoroughly useful and practical for the purposes of the busy surgeon. Gould has embodied almost without exception the best of modern technique, has put this so clearly that there is no misunderstanding, and with rare judgment has so selected his pictures that they in themselves are almost sufficient without the text. There is no book published, excepting perhaps Moynihan's work, which will serve as a more useful guide than this. Its success is assured, nor can any operator well dispense with it.

Gould has been especially fitted for this work by a long course of experimental investigation, and has availed himself of the best in current literature. He has by no means endeavored to include all of the operations which have been advocated, but the reader can be quite certain of finding within these pages a complete description of the best.

A TEXT-BOOK ON THE PRACTICE OF GYNECOLOGY. By William E. Ashton, M.D., LL.D. Third Edition, Revised and Illustrated. W. B. Saunders Co., Philadelphia and London, 1907.

The third edition of Ashton's comprehensive work in itself adequately expresses the fact that the author has furnished a book which has answered the needs of both the specialist and the general practitioner. The alterations made are the introduction of the metric system, some additions to the illustrations, a revision of the chapter on blood in relation to surgery, a consideration of colonic lavage and its modern application, and some changes in the technique of operations which modern practice has indicated to be desirable, together with a practically new section upon intestinal anastomosis based upon Moynihan's admirable work.

Among chapters not always found in such works are those dealing with examination of the rectum, the *x*-rays in gynecology, hydrotherapy, constipation, diet, indoor exercises, saline injections, physiology, antisepsis in hospitals, antisepsis in private houses, appendicitis, and movable kidney.

In the more than one thousand pages which this book contains will be found included accurate, minute, and quite ade-

quate descriptions of all modern operations, together with an unusually full discussion of symptomatology and medicinal and hygienic treatment.

This book easily ranks with the best on the subject, and because of its completeness and the skill with which the last edition has been revised is likely to achieve even a wider popularity than has heretofore been accorded to it.

CORRESPONDENCE.

LONDON LETTER.

BY G. F. STILL, M.D., F.R.C.P.

The Royal Medical and Chirurgical Society is presumably nearing the termination of its existence as a separate entity among the learned societies of London. The practical details of the scheme for the amalgamation of the chief medical societies of London are fast being matured, now that the principle has been accepted. But in the evening of its existence this society shows no lack of vitality: an interesting lantern demonstration of the spirochæta pallida was given at a recent meeting by Dr. A. MacLennan, who had come from Glasgow for the purpose; and not the least interesting feature of his remarks was the obvious hesitation in accepting this organism as the specific cause of syphilis. Any one who has made himself familiar with the various organisms which observers profess to be able to distinguish from the spirochæta pallida, and which these observers admit to be found in many non-syphilitic conditions, must realize that the distinctions are so subtle that the specificity of any one spirochæta must not be accepted without question. But Dr. MacLennan pointed out other difficulties: syphilis has been inoculated experimentally, but the material used for inoculation has not contained the spirochæta pallida; this he suggested might be due to the fact that the organism assumes different forms at different periods of its life-cycle, and may be present in some form quite unlike the spirochæta stage, and as yet unrecognized. Then again congenital syphilis exhibits the spirochæta pallida in large numbers, and yet as every one knows the infectivity of congenital syphilis is so low that many clinicians who see very large numbers of syphilitic children have never seen a case of undoubted infection from congenital syphilis. In contrast with the large numbers of the spirochæta which are to be found in the lesions of congenital syphilis is the scarcity of this organism in the discharge from primary sores, and from secondary lesions of the skin or mucous membranes, the very lesions which are known to be the chief sources of infection. On the whole it seems difficult to accept Dr. MacLennan's position that although the spirochæta has not been established as the cause of syphilis, its presence can be taken as diagnostic of syphilis.

There has been much talk in London recently about the milk supply, especially with reference to infant feeding. A meeting was held at the Institute of Hygiene to protest against the use of chemical preservatives in milk, and there have been two prosecutions within the past few weeks in provincial towns for adding boric acid to milk or cream. The trade view would seem to be that either preservatives must be added or sterilization must be practiced; and indeed there is something to be said for such a view if it is true, as was stated last week by a witness in a trial in London for adulteration of cream with starch, that it is a common practice to keep cream in stock as long as four days before it is sold as fresh cream. Sterilization, however, is certainly not the ideal remedy, and when it became known that Mr. John Burns, the president of the Local Government Board, intended to introduce a bill into Parliament legalizing the establishment of municipal depots for the supply of sterilized milk for infants, a deputation was organized a few

days ago to wait upon this minister and to urge upon him the mischief of such a measure. The deputation included Sir Thomas Barlow, Sir Lauder Brunton, Dr. H. Ashby, Dr. Cheadle, and Dr. Eustace Smith. Sir Thomas Barlow acted as chief spokesman. He said that sterilization is only a second-best process, and might bring certain evils in its train; scurvy and rickets are liable to occur in children fed on sterilized milk; and when once milk has been sterilized it is no longer possible to test the goodness of the supply. The better alternative is proper refrigeration of the milk immediately after it is taken from the cow, sterilization of the vessels in which it is stored, and proper precautions to insure the milk being kept cool in transit. Sir Lauder Brunton followed in the same strain, and advocated the appointment of a joint committee from certain bodies—the National League for Physical Health and Improvement, the National Health Society, and the Infants' Health Society—to investigate the conditions of the milk supply for infants. The president of the Local Government Board adopted the customary attitude of cabinet ministers receiving deputations, namely, the attitude of non-committal; only on this occasion he seemed to imply that the deputation was not likely to influence any legislation on the subject.

It is always interesting to hear the pure physiologist discourse on the practical problems of medicine, for he brings to bear on them a knowledge of the subtler processes of life which we, alas! either know only second-hand or worse still have long reckoned amongst the things we "used to know." Professor Halliburton, the famous physiologist, has recently been addressing a lay audience at the Institute of Hygiene on "The Diet of To-day," and the habitual "diner-out" may be pleased to hear that it is safer to eat too much than too little. He was not inclined to agree altogether with Professor Chittenden's views as to the small amount of proteid food which is advisable; the minimum diet, he said, is not necessarily the optimum diet. The poor in large cities subsist like the vegetarian on a minimum quantity of proteid food, but both these classes of people prove weak in resistance to hardship and disease as a rule compared with people who are free consumers of meat; and the excellent results which follow an extremely liberal diet in various diseases, such as tuberculosis and some nervous disorders, are sufficient to show that a large amount of proteid as well as other food may be useful. The proteids of animal origin are, he said, easier of digestion than those of vegetable origin, and so even the vegetarian is obliged to allow the value of milk, cheese, and eggs. Professor Halliburton expressed some doubt as to the supposed abstemiousness of the Japanese in regard to proteid food, and thought that their recent prowess might be due to recent departure from their vegetarian habits.

At the Clinical Society this month Dr. Langmead reported a curious group of symptoms observed in three children during the past few years at the Children's Hospital, Great Ormond Street. In each there were recurrent attacks of tetany associated with chronic dilatation of the colon, and the stools were unhealthy and offensive. The youngest child was 2½ years, the oldest 6 years: all died of complications. It has long been known that tetany is associated with unhealthy conditions of the intestine, and these cases with dilatation of the colon support the view that tetany is due to some toxic absorption from the bowel.

Another condition which might well have puzzled the diagnostician was described at the Medico-Chirurgical Society a few days ago by Dr. West and Dr. Clarke. A woman aged thirty-seven years became cyanosed suddenly about eighteen months ago; since then she has remained cyanosed, the only other symptoms being headache, weakness, and constipation. There were no physical signs of any sort to explain the cyanosis; the spectroscope showed sulph-hemoglobin in the blood. Very few cases of this sulph-hemoglobinemia have been recorded before; its cause is unknown.

This week Dr. Charlton Bastian, who has for thirty years combated the now generally accepted doctrine *"omne vivum e vivo,"* has

again brought before the scientific world experiments by which he claims to have proved that certain low forms of life, such as bacteria, torulæ, and molds, may originate *de novo*. He heated solutions of ammoniacal salts, with no carbon present in the solution, up to temperatures ranging from 239° F. to 266° F. for ten to twenty minutes; the tubes containing the solutions had been hermetically sealed, and submitted previously to an even higher temperature. They were then exposed to daylight or placed in an incubator for periods varying from five weeks to four months; at the end of this time they were found to contain various microörganisms. Control tubes which were opened after only a few hours' incubation showed no microörganisms. But every bacteriologist is familiar with the fact that certain spore-forming microorganisms will survive exposure to temperatures far above boiling point, and it may be doubted whether Dr. Bastian's interesting experiments prove more than the difficulty of real sterilization of any fluid; but as usual the lay press has seized upon the pronouncement as a step toward the solution of "that insoluble problem, the origin of life."

The daily papers have been much occupied of late with the now notorious Edalji case, into which an element of medical interest has been imparted by the vigorous effort of Sir Arthur Conan Doyle, the author of "Sherlock Holmes," to prove that Edalji was innocent of the crime for which he has been imprisoned, namely, wanton maiming of cattle. Conan Doyle is himself a medical man, and he has relied much in his argument on the error of refraction which in his opinion would have made it impossible for this young man to go out at night without glasses and mutilate a pony as he is supposed to have done. Medical opinion seems to be divided on this point, but there appears to be a general consensus of opinion that it is highly improbable that this young Parsee, a quiet, studious lawyer, should have been guilty of the crime attributed to him. The judge is now public opinion, the legal authorities have long ago made up their minds, and it remains to be seen whether the genius of Sherlock Holmes can unsettle them.

THE TREATMENT OF SCARLET FEVER.

To the Editor of the THERAPEUTIC GAZETTE.

SIR: I have just read with much interest in the January, 1907, number the article on the use of chloral hydrate in the treatment of scarlet fever. I am not now in general practice and have had no experience with chloral hydrate in the treatment of this disease. According to the tables, although the death-rate was low, all of the plans of treatment were unsatisfactory, considering the time of treatment and the postfebrile nephritis.

I write to call the attention of your readers to the use of sodium sulphite in the treatment of scarlatina, so long ago recommended by Tyrrell. My plan of treatment was as follows:

1. Sodium sulphite ℥ss. Dissolve in twenty-four teaspoonfuls of water. Give a teaspoonful every hour. Give water before the dose, none after. Use the pure, dried, powdered drug. Dose according to age. The main point is to give large doses, and saturate the system as soon as possible.

2. Anoint the skin with phenol camphor 25 per cent; vaselin, white, 75 per cent.

3. Place a Bologna sausage skin filled with ice, wrapped in two or three folds of muslin, around the neck, holding it close under the angles of the jaws. An ice-bag would be more elegant, but it is not always to be had.

In this treatment we have an internal and external antiseptic and parasiticide, and an effective remedy for the angina. My experience with it has been that within two to four days the fever subsided, the inflammation of the skin disappeared, within a week or ten days the patient was well, and no kidney complications arose.

It would be well worth the while of physicians who are in the midst of epidemics to give this treatment a trial.

THOMAS A. ELDER, M.D.

WOOSTER, O.

Digalen

(Digitoxinum Solubile Cloetta.)

Reliable Heart Tonic.

"Most important addition to medicine since the introduction of cocaine," writes a prescriber.

Advantages:—Exact dosage; prompt effects; no gastric disturbances; may be given per os, per enema, by intravenous, subcutaneous or intramuscular injection.

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Employed successfully in a wide range of skin diseases and in numerous gynecological affections.

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A soluble form of guaiacol—odorless; non-irritating; readily assimilated.

Both creosote and guaiacol are prone to disturb digestion and impair the appetite. Thiocol, on the contrary, stimulates the appetite and does not irritate the gastro-intestinal tract.

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Odorless Wound Antiseptic.

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Invaluable, therefore, for arresting the lingering cough or cold.

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Indicated in Rheumatism, Gout, Lumbago, etc.

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Guarding your rights along these lines as carefully as we do, we beg of you to read the announcements of our advertisers, and favor them with inquiries and requests for samples; and when so doing, please be so kind as to mention having seen the advertisement in the THERAPEUTIC GAZETTE.

To the notes below and on the following pages, also in future issues, we respectfully direct your attention.

Yours very truly,

THE BUSINESS MANAGER.

Box 484, Detroit, Mich.

ON THE USE OF CALOMEL OINTMENT IN THE TREATMENT OF SYPHILIS BY INUNCTION.—Notwithstanding the well-recognized fact of the specific action of mercury in curing syphilis, this insidious disease still continues to present the spectacle of vital organs in which its malign elements are seated, incurable diseases which are its direct outcome and offspring, and persistent continuation of its contagious and transmissible properties.

The common delusion continues to manifest itself that a momentary disappearance of symptoms is synonymous with a cure, and many are the victims of this delusion.

Notwithstanding their distrust of the apparently innumerable methods of treatment, sufferers from this disease are still allured by the various disagreeable features of customary therapeutic measures.

Among these may be mentioned the pains, the formation of infiltrations, the danger of acute mercurial poisoning which attend the treatment by injections; the irritation of the stomach and intestine which so often characterizes the internal use of mercury; and the entire series of disagreeable features which attend the inunction treatment with the uncleanly, repulsive, and unreliable mercurial ointment. In view of these facts the authors commend the inunction treatment with Calomelol Ointment, which, though it may not be more effective than the ordinary inunction treatment or the treatment by injections, is much more attractive and much more easily carried out.

For most patients, but especially for women, it is infinitely to be preferred.

In other words, by the use of Calomelol Ointment the physician has far less difficulty than with other medicinal substances in inducing patients to undergo the necessary periodical courses of mercurial treatment which, to the number of seven or eight, the authors are constrained to recommend as necessary during the first four years of the disease.

In addition to the lard (adeps), which is the foundation of Calomelol Ointment, it contains 45 per cent of Calomelol, which consists of calomel in a colloidal or soluble form. Calomelol is a fine, grayish-white powder, odorless and tasteless, which is soluble in water one part to fifty, and also in blood serum, in the secretions of the body, etc. It contains 66 per cent of metallic mercury.

In addition Calomelol Ointment contains 2 per cent of free metallic mercury, which increases its effectiveness without depriving it of its meritorious features, namely, non-discoloration of the skin when used by inunction, and non-soiling of the underclothing.

The ointment can be rubbed into the skin with great ease, and leaves upon it a barely perceptible white deposit. The deposit does not leave any stain upon the underclothing.

The absorption of mercury was quickly manifested in all the cases which came under the observation of the authors by its presence in the urine.

The average quantity of Calomelol Ointment required for a single inunction is 90 grains, and the number of inunctions required for a course of treatment is thirty.

Irritation of the skin in the form of follicululitis has never been observed as a consequence of this treatment.

In almost all the cases which have been treated by the authors with this substance secondary syphilitic phenomena were present.

Mucous patches in the mouth and condylomata upon the genitals promptly disappeared, though they did not receive special local treatment.

The small papular and impetiginous syphilides, which are usually quite rebellious to treatment by inunction, rapidly underwent retrograde changes.

Particularly gratifying results were obtained in the treatment of erythematous patches.

Injections of Calomelol in solution did not give results sufficient to encourage further investigation. Calomelol Ointment and Calomelol in the form of dusting powder were used

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Gastritis,	During Maternity,	Diabetes,
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for local application in various conditions especially upon local syphilitic lesions, the effect being prompt and satisfactory.—PROF. NEISSER and DR. SIEBERT, in *Medizinische Klinik*, 1905, No. 1.

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THE attention of the medical profession is being directed to the use of Sal Hepatica in typhoid fever and inflammatory conditions of the bowels. It appears to be a very safe saline laxative in such affections, being less obnoxious to the organism than sodium phosphate alone or other salines, and is more readily eliminated.

By commingling lithium and sodium phosphates in proper proportions with certain of the "Bitter Water" salts, the manufacturers of Sal Hepatica claim a compound is secured that is superlatively more active than either the lithium or sodium salt alone, or, indeed, than any of the natural purgative mineral waters. Recognizing this, the most eminent practitioners latterly have taken to prescribing Sal Hepatica in preference to the natural waters, with the result that the remedial action of the latter is enhanced, the untoward manifestations accruing reduced to a minimum, and their palatability materially increased.

Sal Hepatica is very effective in limiting and reducing the amount of uric acid formed within the circulation and excreted by the kidneys, and is freely absorbed and taken into the blood and as rapidly (along with the chemical products formed) eliminated by the excretory ducts or

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organs, as is readily demonstrated by its presence, after a brief course thereof, in perspiration and urine, the latter more particularly being doubled or trebled as to quantity and rendered decidedly alkaline.

Sal Hepatica is the original effervescent saline laxative, hepatic stimulant, uric acid solvent, and eliminant of irritating toxins in the alimentary tract. It is manufactured under the direct supervision of J. Le Roy Webber, Ph.G., its originator, and only at the laboratories of the Bristol-Myers Co., manufacturing chemists, 277-279 Greene Avenue, Borough of Brooklyn, New York City.

BENZO-KINONE, A NON-CAUSTIC, SOLUBLE DERIVATIVE OF GUAIACOL.—Although benzokinone ($C_4H_6O_2$) exists in minute quantities in nature, it belongs more especially to that class of remedies which are the product of synthetical organic chemistry. It is an extremely deliquescent crystalline salt, so easily acted on by light and air that it is necessary, in order to preserve it from decomposition, to administer it as a palatable syrup, which preserves it indefinitely.

Benzo-kinone has been successfully tested in comparative trials with creosote, carbolic acid, guaiacol, and derivatives of that class, in pulmonary tuberculosis, catarrhal troubles, bronchitis, and many stomach and intestinal diseases, where antiseptic action by increasing the activity of the phagocytes is desired. It is better tolerated even in large doses than any other of this large class of new remedies.

Benzo-kinone is rapidly taken up by the blood and carried by the circulation to the pulmonary lesions, thus maintaining conditions which inhibit further tubercular degeneration of lung tissue. The urine soon shows its presence when tested with perchloride of iron, and the same test will show that its antiseptic action is continuous in the intestines.

Tuberculosis of the lungs is one of the most difficult diseases to arrest, because the bacillus which forms the toxic ptomaines that sap the patient's vitality is surrounded by an impregnable wall of connective tissue that shuts off all approach of the blood current and hinders the action of the phagocytes; it is found that with this agent it is possible to so saturate the blood that the antiseptic conditions once well established prevent further autoinfection. This process once arrested, the purulent and effete matter is expelled by expectoration or absorbed in a comparatively aseptic condition, the existing lesions heal, while the causes of the fever,

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night-sweats, cough, and pain, being removed, a healthy disposition to gain flesh is induced.

Benzo-kinone will do all that is claimed for creosote or guaiacol preparations, without their untoward effects on the stomach and kidneys; the fever, cough, night-sweats, and accelerated pulse soon diminish under its use, and the rapid improvement which follows should encourage us to continue it where patients are benefited, more especially as it is recognized that the mental worry and the morbid dread of the patient once relieved the chances of recovery are greatly enhanced.

With the benzo-kinone treatment and intense nitrogenous alimentation, cases have been recorded, apparently beyond hope of recovery, which regained comparative health, while threatened cases and those with mild symptoms of phthisis are often wonderfully benefited. The administration of benzo-kinone in no way interferes with general tonic treatment, and the advantages of good air, exercise, and food.

Benzo-kinone has more recently been used in combination with heroin with very satisfactory results. Its combination with iron or mineral syrups should be avoided.

Benzo-kinone is dispensed only in the form of a syrup-elixir, containing ten centigrammes (2 grains) of the salt to the teaspoonful. This dose should be given about an hour after meals *well diluted with water*. It does not upset the stomach, and is in no way objectionable to the patient. It recalls in taste "Chartreuse," and being slightly alcoholic is therefore stimulating. The dose is a teaspoonful at least three times a day, but it may without danger be given in teaspoonful doses even six times daily; generally, however, smaller quantities are sufficient to bring the patient rapidly under the influence of the drug.

STONE RIDGE, N. Y., Nov. 27, 1906.

The Anasarcin Chemical Co., Winchester, Tenn.:

The sample "Anasarcin" you so kindly sent me I used upon the following case: P. J., male, merchant, aged 65; heart dropsy; limbs swollen to knees very badly; compelled to bandage them; very short of breath; could not lie down; what little sleep he obtained was had sitting in chair. His family gave up all hope of his recovery. On the morning of the 8th of November commenced "Anasarcin," three tablets a day, and every other day a tablespoonful sulphate magnesia. On the 18th of November discontinued my visits as the swelling had entirely disappeared; he could sleep in bed with comfort; appetite good, and patient in excellent spirits. I advised him to continue one tablet

TANNALBIN
Intestinal astringent and antidiarrheal.

ICHTHALBIN
Best internal application of Ichthyol

STYPTOL
(neutral cotarnine phthalate)

IN UTERINE BLEEDINGS

Styptol is an efficient hemostatic and sedative with antiphlogistic properties. It lessens the secretion of the endometrium and never causes uterine contractions. Indicated in Menorrhagia, Dysmenorrhea, Hemorrhage from the genito-urinary tract, etc.

Application:
Internally in ¾ grain Tablets, 2 to 3 tablets three times daily, locally as a dusting powder or hypodermically in a 10-per-cent solution for the quick arrest of severe hemorrhage.

SANTYL
(salicylic ester of Santalol)

IN GONORRHEA

Santyl is tasteless and well borne; it does not impart odor to the breath. No irritant action on the kidneys; no gastro-intestinal disturbances. Relieves pain, lessens the purulent discharge, clears up the urine. Acute Gonorrhea and its complications.

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In soluble gelatin capsules of 7 drops each, three capsules 3 to 4 times daily, or 25 drops of the liquid three times daily, preferably in milk.

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of the medicine before each meal three times a day for a few days. To-day he is attending to his business as usual and continues in fair health. Prior to using Anasarcin I had about exhausted the list recommended in such cases and given up hope of the patient's recovery.

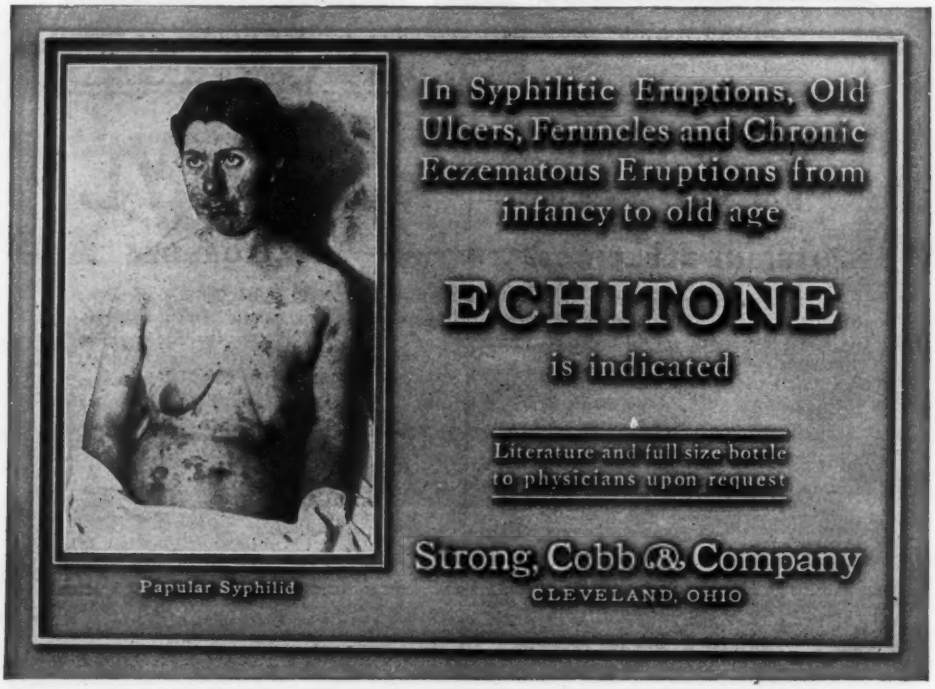
Very truly yours,
HERMAN CRAFT, M.D.

P. S.—You may make use of this letter if you desire. H. C.

A FEW SUGGESTIONS IN THE TREATMENT OF WASTING DISEASES AND FEVERS.—Iron, administered in any form, improves the blood's condition by increasing the red blood cells and their power of carrying oxygen. As a result the patient begins to pick up, but this is the result largely of stimulation, and if persisted in on chronic cases will often meet with reaction. Inorganic iron does not feed the newly-born cells, it simply stimulates! A close microscopic study of blood will demonstrate that many new cells never reach maturity. The fault is that inorganic iron does not contain the essential elements of nutrition. In mild anemia and general debility this is not always so, only in old chronic conditions, where the nutrition of the body has become greatly impaired. General tonics affect in a like manner through different sources. Prepared foods have their usefulness, but with one exception to a very limited degree. One is rich in a certain element of nutrition, and deficient in others; another will be abundant in other elements and lack what the other had; therefore in advanced stages of anemia and malnutrition their usefulness is limited.

Where Bovinine is administered a result of this kind does not happen, for the reason that it contains every element of nutrition, together with normal organic iron, which is more readily assimilated than inorganic iron, does not constipate or overstimulate the young cells; consequently there can be no form of malnutrition or anemia that is not fully and completely met, whether it be local or general. Bovinine is a thoroughly sterile preparation, gently stimulant, and requiring little or no digestion, a point of great importance in the treatment of all chronic conditions, wasting diseases, and fevers.

Chronic Gastritis and Ulceration.—In chronic gastric inflammation and ulceration the treatment should consist in rest, close attention to diet and secretions, and medicines applied symptomatically as indicated. In severe cases absolute rest in bed should be enforced until the symptoms have subsided. The food must be easy of digestion and non-irritating, taken in small quantities and often. If the case be


In Syphilitic Eruptions, Old Ulcers, Feruncles and Chronic Eczematous Eruptions from infancy to old age
ECHITONE
is indicated
Literature and full size bottle to physicians upon request
Strong, Cobb & Company
CLEVELAND, OHIO
Papular Syphilid

an external one, rectal feeding should be adopted until the stomach is able to retain food comfortably. It is largely conceded now by the profession that Bovinine is the nourishment tacitly indicated in all such cases, using anywhere from ten to thirty drops, according to the case, every one or two hours, in milk that has been peptonized, water, or cold bouillon. From this administration it has been conclusively proven that the stomach gets almost complete rest, even while receiving this full nourishment; and so the most perfect nutrition of the system, including the diseased part of the stomach itself, is kept up without interruption, without irritation, and without injurious functional labor.

A Revolution in Digitalis Medication.—Dr. A. Eulenberg, of Berlin, in *Medizinische Klinik*, No. 6, 1906, writes of "Intramuscular Injections of Digalen" as follows:

Digalen (an aqueous-glycerin solution of digitoxinum soluble, Cloetta) has proved to be, during the last two years, by far the best digitalis preparation. In fact, one may safely say Digalen is the only useful preparation of digitalis, and is likely to produce a complete revolution in digitalis medication. When given internally it is superior to all the older forms of digitalis, such as infusion, tincture, etc., in that its action is rapid yet safe; that it does not induce gastric disturbance; that it is well tolerated and readily absorbed. There are many cases, however, in which one would like to exhibit the remedy in a manner which promises more energetic and prompter action than when administered per os. In such instances intravenous injections, first recommended by Dr. Kottmann, of Naunyn's Clinic, are advisable; subcutaneous injections frequently provoke irritation. Among others, Dr. F. Mendel, in a brief monograph entitled "The Intravenous Digitalis Treatment: A New Therapy in Cardiac Affections," strongly advocates this method. He does so on the strength of having administered over 1200 injections. In private practice it may sometimes be preferable to employ another method, one which appears to be no less effective. I refer to deep intramuscular injections, which I have made quite often lately in cases requiring prompt and energetic digitalis action. I have had, for instance, splendid results in two cases of Basedow's disease with arrhythmic pulse and heart insufficiency; in paroxysmal tachycardia; in chorea with recent endocarditis after acute articular rheumatism; in old valvular diseases with lack of compensation; in fatty heart with insufficiency; and in

Cystogen-Lithia

Effervescent Tablets of { **Cystogen 3 grains** / **Lithium tartrate 3 grains**

Uric acid Solvent, alkaline urinary antiseptic.

DOSE—One or two tablets in a glass of water, three or four times daily. They should be dispensed in the tubes to preserve the effervescent property.

Where Cystogen is indicated, Lithia is of advantage; Where Lithia is prescribed, Cystogen is indicated.

Indications—Rheumatism, gout, urinary deposits, calculus, cystitis, prostatitis and gonorrhoea. A good urinary antiseptic during convalescence from typhoid and scarlet fever.

CYSTOGEN CHEMICAL CO., ST. LOUIS, U. S. A.

CYSTOGEN PREPARATIONS:

Cystogen—Crystaline Powder.
Cystogen—5-grain Tablets.
Cystogen-Lithia (Effervescent Tablets)
Cystogen Aperient (Granular Effervescent Salt with Sodium Phosphate.)

SAMPLES ON REQUEST.

C L 4

arteriosclerotic myocarditis. I can warmly recommend these injections wherever immediate digitalis action is required. They are easy to administer, are practically painless, and do not provoke local irritation. Digalen is best injected into the gluteal muscles (according to Haffter) or into the extensors of the thigh. The single dose is usually 1 Cc. (16.9 min.) of the solution. No cumulative action being likely to supervene, the injections can be repeated as often as the special case requires it. As with all intramuscular injections—asepsis, a deep puncture (with a long needle, not too fine nor too flexible), and slight local massage afterward are, of course, *de rigueur*.

CALX IODATA IN WHOOPING-COUGH.—I thought I would write to you some of my experience with calx iodata. Some time ago my attention was drawn to calx iodata by a "drug man," so I ordered an ounce of tablets to try in a case of croup if I had a chance. While waiting for the croup to appear I had a case of whooping-cough.

No. 1. Boy about eight years old. Parents tried all kinds of remedies but with no results. I gave him calcidin and calcium sulphide, and had him on the road to recovery in a few days.

No. 2. Girl, three weeks old. Gave calx iodata to saturation. This baby coughed continually. In twenty-four hours was easier and recovered in a few days.

No. 3. Boy, six weeks old, whooped every half-hour during the night, but not so bad daytimes. Gave him sixteen tablets in sixteen teaspoonfuls of water, directions one-half teaspoonful every hour until relieved—then every two hours. The next night he coughed three times, continued to for a week, and then was well.

No. 4. Boy, five years old. Whooping cough. Would vomit every time he coughed, and was weak from want of nourishment. I gave calcidin every two hours. Next day he was better but vomited some. In three days no vomiting, and gaining in strength. No more whooping-cough.

No. 5. My three boys, aged eight months, three years, and five years. All came down with whooping-cough. I gave the baby calx iodata, and in a week no more whooping-cough at night. Slept well. The other boys calcium sulphide. The one aged three years would whoop twice at night after giving the treatment. The oldest one "whooped" twice and all told made a very quick recovery.

I treated over sixty cases of whooping-cough

ANALYSIS

CHICAGO, May 13, 1905.

Gardner-Barada Chemical Co., Chicago, Ill.

GENTLEMEN: Sample of "Uriseptin" manufactured by the Gardner-Barada Chemical Co., Chicago, Ill., was found to contain:

Specific Gravity at 15.5 C...	1.0716
Total Solids	20.42 p. c.
Alcohol (Ethyl)	7.66 "
Water (by Difference)	71.92 "
Total Ash	1.46 "
Lithium Oxide	0.50 "
Formaldehyde	5.62 "
Acidity 100 cc. equals 6.4 cc. Normal Alkali.	
Sugars	Present
Couch Grass Extract	"
Corn Silk Extract	"

The Total Solids consist mainly of the sugars and extracts of corn silk and couch grass. The couch grass and corn silk extracts were determined by taste and smell in comparison with authentic samples of same products. The Lithium Oxide and the Formaldehyde are in combination in the Uriseptin and together represent 26.77 grains per liquid oz.

I remain, Yours very truly,
(Signed) DR. EDWD. GUDEMAN.

State of Illinois } ss.
County of Cook }

Subscribed and sworn to before me this 13th day of May, 1905.
(Signed) PAUL E. RUEDEFELDT,
Notary Public.

URISEPTIN

Is the SUCCESSFUL Urinary Antiseptic.

Liberates Formaldehyde slowly in the kidneys.
Makes the Urine Antiseptic.
Keeps the Urinary Tract Aseptic.
The only Urinary Antiseptic that has soothing and diuretic action.

Dose: Tablespoonful night and morning, or one or two teaspoonfuls every 2 or 3 hours, always with plenty of water.

GARDNER-BARADA CHEMICAL CO.,
633 N. Western Avenue, CHICAGO, U. S. A.

INDICATED IN

Pyelitis	Rheumatism
Nephritis	Calculus
Prostatitis	Gout
Cystitis	Bacteriuria
Urethritis	Uremia

We will send any physician an 8 oz. bottle (price to patient $1.00) on receipt of 25c. to pay express.

last winter (1905-6) from three years of age to forty, and with children who couldn't swallow a pill I gave the calx iodata in solution of water, and gave it to saturation and gave it quickly, and with as good results as if I had given calcium sulphide, as I did with the older ones. Didn't have a case that didn't get well with this treatment. Also used calcidin in Pott's disease with good results, also in enlarged tonsils, glandular enlargements, disease of middle ear, etc.

I know of several doctors in this neighborhood who used it with the same results.—P. E. HANES, Maynard, Ia., in the *American Journal of Clinical Medicine*, February, 1907.

ANEDEMIN (opposed to edema), composed of the active principles of Strophanthus Hispidus, Apocynum Cannabinum, Urginea Scilla, with Sambucus as adjuvant, possesses great potency through the collaboration of its components, and is vastly superior to digitalis, elaterium, sparteine, and the remedies ordinarily prescribed for the removal and relief of dropsical effusions, possessing none of their objectionable properties, features, or untoward effects. It has no cumulative action whatever, and is strictly non-toxic, producing no gastro-intestinal disturbance. It is easily administered, being in tablet form, chocolate-coated.

Anedemin does not produce vasomotor contraction, like digitalis and its derivatives. It is a vasomotor dilator and increases the arterial output; it acts less upon the medullary and peripheral nerves. Anedemin accelerates the flow in the thoracic duct, rapidly returning the serum to the blood by the lymphatic channels, as well as by resorption into the blood, from whence it is removed by purgation and diuresis. As a restorer and maintainer of perfect balance between the arterial and venous systems Anedemin is ideal; as a true cardiac tonic it is unsurpassed. It increases both the nutrition and power of the cardiac muscle, empties more completely the chambers, and diminishes regurgitation. In mitral insufficiency its results are marvelous. Anedemin surpasses digitalis as a stimulant of the renal function. The transudation of the glomeruli is increased, renal congestion relieved, and reparation of the parenchyma and interstitial structures brought about. In all forms of edema Anedemin will be found the remedy *par excellence*, positive in its action and definite in results.